

# *The* **MINING** **CONGRESS** **JOURNAL**

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**Promotion of Safety in Mechanized Mining  
in Illinois**

**Safety in Mechanized Mining**

**Mining Methods in Arizona Copper Mines**

**The Coal Convention and Exposition**

### ***Contributors:***

*K. C. Leith, E. F. Stevens, Edward Leming, G. N. McLellan  
J. P. Hodgson, G. B. Lyman, W. Crawford*

**JUNE**  
**1935**

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# The MINING CONGRESS JOURNAL

JUNE  
1935



VOLUME 21  
NUMBER 6

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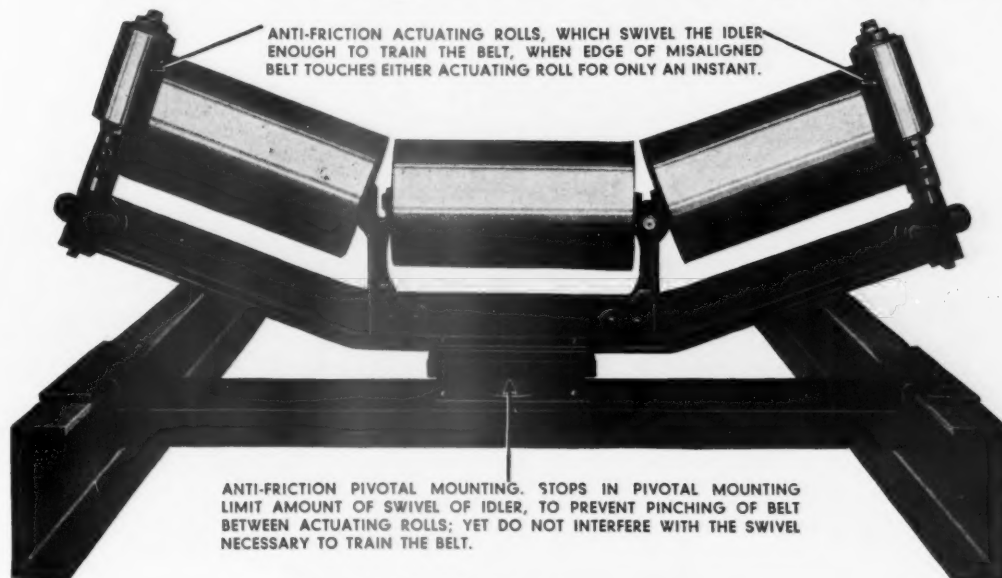
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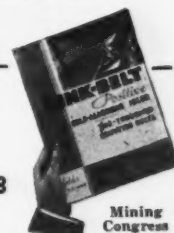
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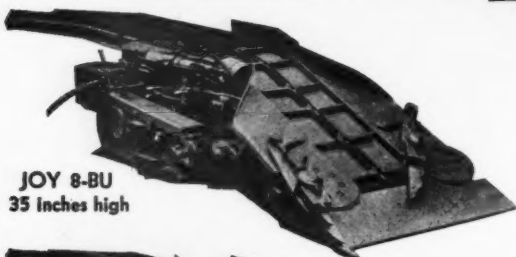
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# The Re-Birth of Democracy

**L**ONG before the opening hour, on May 27, 1935, the Supreme Court Chamber in the National Capital, was crowded to the limit. An atmosphere of expectancy prevailed throughout the audience. At precisely 12 o'clock the gavel of the bailiff brought everyone to his feet. The black-robed Justices filed into their positions, the gavel of the Chief Justice fell and all were seated. For two years the nation had been drifting from its moorings toward socialism, after which the followers of Jefferson believed its choice necessarily lay between communism and autocracy.

Whether these dangerous experiments should be continued or whether we should return to those principles and policies which had made this country great was now to be determined by that magnificent body of jurists, the Supreme Court of the United States. Three enormously potential questions were determined by the Court.

First, shall the Executive of the United States have power to influence or control activities of quasi-judicial bodies appointed by the President for definite terms of years by and with the advice and consent of the Senate, or shall these bodies be permitted to exercise their uncontrolled judgment in the determination of semi-judicial questions.

Second, has the Congress of the United States power to divide wealth; to take from the rich and give to the poor; to set aside contractual relations; to take from creditors for the benefit of debtors; to break down that confidence which leads to investment and to take from skill and management the possibility of securing capital necessary to make use of that skill in the development of business. Third, (a) has the Congress of the United States the right to delegate its legislative power; and (b) has the Federal Government the power to control intrastate business affairs within the several states.

For many years there has been a continual trend toward centralization of power in the Federal Government. Gradually the rights of the states have been curtailed. For many years there has been a continual increase of Government expenditures and of tax liability because of the increasing activities of the central government.

These thoughts centered the attention of the people of the United States upon the nation's capital.

The first opinion, in the Humphrey case, was voiced by Justice Sutherland. William E. Humphrey had been reappointed to the Federal Trade Commission by President Hoover for a period of seven years as provided by the law creating that Commission. Appointment had been confirmed by the United States Senate. After less than two years' service, Mr. Humphrey's resignation was asked for by the President upon the ground that his ideas as to functions of that Commission could be carried out better by men of his own choosing. Mr. Humphrey's refusal to resign was followed by an order of the President ousting him from office and by the selection of a successor who qualified and has since served as a member of the Commission.

It was the unanimous opinion of the Supreme Court of the United States that the law creating the Federal Trade Commission anticipated its entire independence of outside influence and that the President had no right to control the judgment of the Commission through the power to oust from office those members not willing to yield to the President's desires.

The second opinion was presented orally by Justice Brandeis in the Frasier Lemke Farm Mortgage Case.

The Court not only declared the law unconstitutional but pointed out many of the grave objections which apply to such an effort to confiscate property without due process of law. It was pointed out that in the final passage of the bill in Congress it was stated that its enactment would make it im-

possible for farmers, in the future, to borrow money. To meet this objection it was decided to make the bill apply only to loans then in existence. With the keen analysis of the ostrich, which hides its head in the sand, Congress proceeded to pass the act, knowing full well, that the enactment of such a bill was a complete and effectual bar to all farm loans in the future. The excuse for such legislation was that thousands of farmers who had defaulted on their mortgage contracts might be divested of their equities by foreclosures unless some way could be provided to prevent the enforcement of mortgage contracts.

The opinion in the third case, the Schecter poultry case, was delivered by Chief Justice Hughes, who outlined at some length the purposes of the National Industrial Recovery Act, the processes through which it functioned and the powers delegated to the President in connection therewith.

Upon this point the Court held that "Such a sweeping delegation of legislative power finds no support in the cases relied upon by the Government."

Upon the question of congressional power to control intrastate business the Court held that "the attempt through the provisions of the Code to fix the hours and wages of employes of defendants, in their intrastate business, was not a valid exercise of Federal power." "On both the grounds we have discussed," said the Court, "the attempted delegation of legislative power, and the attempted regulation of intrastate transactions which affect interstate commerce only indirectly, we hold the Code provisions here in question invalid and the judgment of conviction must be reversed."

"The question of chief importance," said the Court, "relates to the provisions of the Code as to the hours and wages of those employed in defendants' slaughter markets. It is plain that these requirements are imposed in order to govern the details of defendants' management of their local business."

"The distinction between direct and indirect effects of intrastate transactions upon interstate commerce must be recognized as a fundamental one, essential to the maintenance of our constitutional system. Otherwise as we have said there would be virtually no limit to the Federal power and for all practical purposes we should have a completely centralized government."

And thus comes to an end an important part of an inglorious effort to substitute Federal control for individual incentive.


Its justification was a declared national emergency. Upon this point Justice Hughes declared that "extraordinary conditions do not create or enlarge constitutional power."

The writer regrets that a similar death blow could not immediately befall the Agricultural Adjustment Act and the Tennessee Valley Authority instead of waiting until litigation can wend its weary way through the courts to the certain determination to which the decision in the poultry case so clearly points.

Let the new deal scrap its foolishness and as quickly as possible return to the fundamental policies laid down by Thomas Jefferson.







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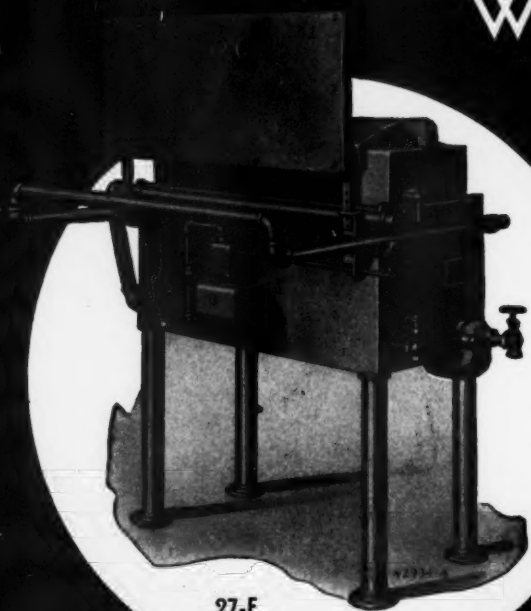
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# The MINING CONGRESS JOURNAL

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JUNE  
1935

*A Journal for the entire mining industry published by The American Mining Congress*

## **A Boom Business**

**T**HE only industry that has not suffered a depression is that run by our Uncle Sam. The business of government has been booming. The *United States News* recently presented a survey of this boom and revealed the interesting fact that in order to handle this expansion the Government has established more than 3,000 new branch offices throughout the breadth of the land. Nor does this figure include the 45,000 post offices, nor the 1,700 offices of the Department of Agriculture, nor the 1,457 Civilian Conservation Corps camps.

These 3,000 branch offices are strictly Federal. They cover such things as the Reconstruction Finance Corporation, the Home Owners' Loan Corporation, the Farm Credit Administration, the Federal Housing Administration, the Regional Labor Boards, and the National Emergency Council . . . all equipped to extend credit, service and advice.

The Government of the United States has become a central planning plant, assuming many of the duties and prerogatives of the states and the individual. Orders issued at Washington are carried out immediately in the far corners of the country. Practically nothing has been left unsupervised by Washington. Even the thousands of relief stations aiding better than 20,000,000 individuals, while technically in the hands of local and state authorities, are definitely a part of the political machine.

The situation is not healthy. It has taken us far from the sound principles laid down by our wise forefathers. The recent decision of the Supreme Court is the first ray of hope that we are not heading straight toward dangerous shoals.

## **An Expensive Proposition**

**R**ECENT press reports stated that "business is paying at the rate of \$53,400,000 annually for the privilege of operating under the Blue Eagle."

This sum obviously does not take into consideration the huge sums spent by industry in its Washington contacts, which have kept Washington hotels filled to overflowing for years; nor the time of executives spent in wrangling with national, state and local authorities. It represents only the outlay for administrative and operating expense.

General Hugh Johnson, ardent advocate of the NRA, in his impassioned plea for the continuance of every vestige of NRA not abolished by the Supreme Court decision, certainly did not mean that one of the items to be retained should be the million-dollar-a-week administration cost of operation for Washington headquarters and branch offices. Admitting that the National Industrial Recovery Act had its good points, one thing Congress and industry should consider in any plan for its continuance in any form is the tremendous cost of operation and whether business can and will willingly assume a continuance of this burden.

## **Labor and Industry**

**I**N THE present confusion, with neither industry nor the Congress certain about what can and cannot be done constitutionally, it is to be hoped that legislation will not be pushed through regardless. At this time strong factions are advocating the immediate passage of the Wagner Labor Disputes Act; there is talk of an effort to force through a 30-hour-week bill; the press is full to the brim of strikes, talk of strikes, threats and ultimatums by labor officials.

From the strictly labor view, strikes in our major industries are to be avoided if at all possible. From the strictly business view, strikes are preferable to the legislation proposed. Passage of the Wagner bill at this time would be but a recognition of the belligerency of labor. The long suffering public may not in the years ahead be so ready to view with tolerancy the assumed "right to strike" as an indisputable principle.

## **Sharp Practice**

**A**UTHORITY for all governmental expenditures must be found in existing law. The Comptroller General of the United States believes firmly in this fact. Therefore, he is looking with a stern eye toward certain procedure in the carrying out of the TVA project. The Comptroller's insistence upon a workmanlike audit of the funds already expended in this enterprise has brought about bitter controversy, and also brought to light certain practices that can scarcely be condoned. A letter appearing recently in the *Congressional Record* states in part: "The testimony recently taken before the Military Affairs Committee of the House discloses that about a million dollars have already been spent up to this time in legal expense defending the TVA from various and numerous injunction suits." Again: In further discussion occupying four pages of the *Record*, reference is made repeatedly to the fact that the Government has acquired "two pieces of land located in strategic points . . . two tracts of land and paid for them." These particular pieces of land were in the heart of a power site planned for the development of Southern mineral resources, and the TVA's purpose was apparently to prevent private enterprise from completing its power plant.

This controversy with Comptroller McCarl has brought out a situation that certainly should be remedied—our Government must not close its eyes on what must be termed "sharp practice" by its agents making checkerboard purchases of key pieces of land. It is amazing that men of mature years and reputed experience in large affairs cannot or did not appreciate the day of reckoning which must inevitably follow the white light of publicity turned upon a proper audit of the people's money which is being spent so prodigally in this venture of Government into competition with private enterprise.

# NATIONAL MINERAL POLICY<sup>†</sup>—

## Purpose of Planning Committee's Recommendations for the Mining Industry

By C. K. LEITH\*

### PAST AND CURRENT TRENDS OF POLICY

**T**HE mineral policy of the United States has never been officially formulated as a whole, but its nature and trends are clear. From the beginning our country has disposed of its mineral rights freely to private industry on generous terms, until there is only a small fraction left under public control. Private operation, individual initiative, and free competition have been encouraged. Anti-trust laws have made free competition imperative. Tariffs have been freely used to encourage domestic production. In one or two cases, like potash and helium, the Government has aided directly in development. Combination for export has been allowed. The "open door" for mineral development and markets has been an outstanding feature of our foreign policy.

Under this policy private industry has successfully developed the minerals of the United States to an extent never before approximated in the world. The job on the whole has been done efficiently and without greater wastes or mistakes than were more or less inevitable under existing conditions of enforced competition and widely scattered ownership of the resources. The desire for efficiency and profit has been mainly responsible for the great gains in conservational practice already made, because the nature and immense diversity of the problems—scientific, technical, economic, and social—have required a variety, elasticity, and boldness of attack scarcely possible under bureaucratic control. American consumers have been furnished the cheapest fuel and some of the cheapest metal in the world. The output per worker in the mines of the United States is generally far higher than in foreign countries. The record of the mineral industry in the United States seems to warrant the presumption that it should continue to develop under private initiative so far as possible.

However, conditions have arisen involving serious financial, physical, and social wastes, which raise a question

whether this policy of *laissez faire* should be supplemented or modified by a larger measure of cooperative action, which may involve more active intervention of the Federal and state governments in the mineral industry. The outstanding change has been a slowing down of the rate of mineral consumption, which has not been compensated by a corresponding lessening of the rate of production or the development of new capacity. The curve of primary production began to flatten during the war, but it has taken us about 15 years to recognize this flattening as probably a permanent change which closely follows the trends disclosed by the older mineral industries of Europe. In the meantime the old psychology of unlimited exploitation has continued, with the result that many of the mineral industries are suffering from overproduction, overcapacity, and ruinously low prices. The new situation calls for cooperation to a degree that was never necessary in the past.

In recent years, and particularly since the war, there has been clear evidence of a shift in public policy. The ideas of conservation and national defense have come forward. The Leasing Act withdrew some of the minerals remaining on the public lands from free entry. The conception that minerals are wasting assets, and as such are a heritage of the people, has been increasingly reflected in state taxation policies. The United States Coal Commission and the Federal Oil Conservation Board were created to recommend changes in public policy for these two minerals. The Oil States Advisory Committee attempted to control oil production. The Appalachian coal decision allowed a larger measure of cooperation than had before been possible under the anti-trust laws. Then came the National Industrial Recovery Act, which was construed as having the

right (since questioned in court decisions) of allowing industry to attempt measures for the control of production, price, and capacity. In oil, this took the form of production control; in coal, of price fixing. The lead, copper, and zinc codes all contain tentative provisions for restriction of production which have only in small part been utilized, but, as you know, these industries are thinking hard about the problem. At the present moment there is the question of continuance of the NIRA and whether, if continued, there should be clear definition of its right to allow price control and restriction of production and capacity. There are bills in Congress relating to production control for coal and oil. Finally there has been more and more discussion of the necessity of modifying anti-trust laws as applied to exhaustible natural resources.

All of these steps seem to indicate a growing belief that there are problems in the mineral industries which may be beyond the power of the industries themselves to solve, particularly those related to unrestrained competition or lack of cooperation among the producers, and that these problems are so involved with questions of conservation, national defense, and social conditions as to be a matter of public concern. The problem is also complicated by emergency relief measures, Federal and state, and by new and acute international difficulties caused by the recent rapid and almost explosive growth of nationalism.

Parenthetically I would call attention to the fact that this situation is not unique in the United States. All over the world mineral industries are in similar trouble, and in most countries the governments have gone much farther than our own in their attempts to solve them. One of the most obvious and extreme manifestations of this trend is the rapid spread of nationalization of resources, using the term in a broad sense to cover all kinds of public control, in all parts of the world, regardless of the highly varied political philosophies of the different countries.

Our own efforts to solve the problem have been scattered and ineffective. Rugged individualism is a peculiarly domi-

\* Vice Chairman, Planning Committee for Mineral Policy, National Resources Board.

† Presented at American Mining Congress Convention of Coal Operators, Cincinnati, Ohio, May, 1935.

nant characteristic of the mineral industries, from their very nature. From time to time producers of some of our 50 commercial minerals have tried to get together by industries, but have made little attempt to cooperate with other mineral industries. They have had immediate short-time objectives. They have not considered all the phases, domestic and foreign, even of their own industry. In Washington there are over a dozen official permanent and emergency organizations working independently on special phases of mineral problems. I am told that Congress now has before it 40 bills relating to mineral resources, many of them intended to correct some detail or another of our mineral policy. Each state is approaching the problem in its own way.

Such confusion is not difficult to understand when we remember that the entire history of mineral exploitation in this country up to the war was one of almost unlimited expansion to meet the mounting requirements of our industrial development, and that we are now required to reverse the gears to meet problems of restriction which are foreign to our past experience.

#### THE PLANNING COMMITTEE FOR MINERAL POLICY

It is this situation which prompted the President, about a year ago, to appoint a Planning Committee for Mineral Policy, made up of representatives of all of the official Washington agencies having to do with minerals, and asked this committee to state the problem as a whole and to formulate a national policy, as a guide to intelligent decision on the many special mineral problems which are pressing on Washington. Later, when the National Resources Board was created, the Planning Committee for Mineral Policy was asked to serve as its Mineral Section, and in this capacity it submitted a preliminary report to the President, as a part of the National Resources Board report. This preliminary report many of you are familiar with. If not, I hope you soon will be. It is brief,—it is more or less of a trial balloon, and does not touch adequately on several questions we hope to take up later. I propose to put before you some of the general conclusions reached by this committee, in the hope that you may help in constructive criticism. We know that we have not said the last word—no one ever will be in position to do that. We have made only a tentative start in setting up the problems of the mineral industry in a broad perspective for your consideration. We recognize the fact that self-interest is, and will continue to be, the driving force in mineral policies, but it is our firm belief that enlightened self-interest requires attention to the general conditions of the mineral industry as a whole, to its long-time trends, and to the public questions involved, and that the solution of some of these broader problems is an essential prerequisite to intelligent planning by the industry.

#### PRODUCTION CONTROL

Some of the mineral industries with surpluses of production, stocks, or capacity have long wanted to balance consumption and production and capacity as a means of maintaining prices, profits, and good labor conditions, and have made many more or less unsuccessful attempts to do so within the limits allowed by the anti-trust laws. Our committee believes that such attempts should be permitted, and even aided, by the Government, not only in the interest of stabilization of prices and employment, but in the interest of conservation and national defense. These industries are based on irreplaceable one-crop resources, some of them of very limited life and all of them subject to depletion of their higher grade and lower cost reserves at too fast a rate for the good of the country. Without going into detail, I may say that our committee has reviewed this aspect of the problem and believes that the unnecessary waste, and particularly the speed with which we are going through the cream of our resources, are matters of demonstrable fact and a matter of public concern, and that they warrant special consideration under the anti-trust laws to allow stabilization.



Dr. C. K. Leith

This exemption should be granted only to those industries that can make a good affirmative case that there is a large and preventable waste of a natural resource due to unrestrained competition, which can be prevented by such exemption. The list will be limited. Coal and oil are certainly in this category; copper, lead and zinc, and others less certainly so. Our thought is that the particular plan should be proposed by the industries themselves; no one in Washington knows enough to superpose one. We believe also that it should be voluntary, in the sense that a majority, both of production and numbers, should favor the plan. It seems clear, however, that the administration of a plan, when once adopted, will require some measure of Government supervision or cooperation, not unlike that which has been attempted by the NRA and the Oil Administration, to

make sure that the plan is carried through, to see that the conservational and social elements of the plan are actually put into effect, and, finally, to insure that the plan is not used merely as a means of collecting higher profits at the expense of the consumer, without corresponding improvement in conservational practice.

Whatever plans may be adopted for the control of production, capacity, or prices, we believe that one step can be taken almost at once. I refer to advance consumption estimates. The oil industry has had the advantage of such estimates for several years, but the Government has made no such periodical estimates for other minerals, and the occasional efforts of the industries to do it for themselves have been hampered by lack of full information and by fear that it might be construed as a step toward restraint of trade. The case seems to us clear that the Government, in cooperation with the industries, and not the industries alone, should prepare these estimates, because it is in a position to collect more adequate data, because it can represent the consumer as well as the producer, and because the figures, when released, will command greater confidence not only by the public but by the industries themselves. The Bureau of Mines is already the repository of most of the needed information for such estimates, it is in a position to draw in needed data from other official and private agencies, and at comparatively small expense can collect the necessary additional information and strengthen its staff for this particular activity. With the approval of Secretary Ickes, the Bureau of Mines' budget in the current Congress included an item for these estimates. I regret to say, however, that this item has been deleted by Congress.

There are many good reasons for the anti-trust laws, and the public is likely to be slow in granting any exceptions to their applications unless the reasons are definite and convincing. It wants, and should have, very definite assurance of conservational and social gains. It will be very suspicious that any such move is really designed only to increase profits. Industry should make up its mind that in return for the advantages to be gained by stabilization through cooperation, the public, through its Government, will insist on some sort of supervision to see that the privilege is not abused. Individual initiative must, in the very nature of the case, be more or less compromised, as has been the case in every advance in civilization from the beginning. There are still plenty of rugged individualists in the natural resource field who insist on the right to do anything they want, even at the expense of their competitors and of the public, who would like greater freedom than is allowed by the anti-trust laws, but who object flatly to any supervision or control by the public as an infringement of their rights. It seems to me clear that the public will not, and should not, allow these privileges without a *quid pro quo*. The practical question is to balance up the long-





*The United States Treasury at Washington*

range gains and losses in any cooperative plan, to define the relations of Government and industry as carefully as possible, and accept the curtailment of entirely free competition as a part of the bargain.

An important consideration in this problem is that mineral industries are for the most part based on a relatively few large sources of supply, a situation which favors concentration of commercial control, and even monopoly, as shown by the history of mineral development. To a large extent this trend is in the interest of conservation and efficiency, and should continue. It is clear, however, that with the anti-trust laws and sentiment as they are, this trend cannot be continued much farther without acceptance of safeguards imposed by the public in the interest of the consumer. Where the conservational advantages are not clear, our committee believes that free competition should be preserved under the anti-trust laws.

The conclusion of our committee, which I have briefly reviewed, is based on long-range considerations and is not directed specifically toward the NIRA or current legislation. Whatever happens to them, we believe that there should be legislation allowing procedure along lines above indicated, and have suggested that a general enabling act for mineral resources might have some advantages in administration and uniformity of principle over special acts for particular minerals. In the meantime we have with us the problem of the NIRA.

The NIRA assumed the right to allow price fixing and production and capacity

control under the codes, and several of the mineral codes contain provisions of one kind or another to this end. But this right has been questioned by the Supreme Court decision and by decisions of lower courts, on the ground that this purpose was not specifically stated in the act. During consideration of the Harrison bill for the continuance of the NRA I presented, as vice chairman of the Planning Committee for Mineral Policy, an amendment to clarify the brief and vague reference to mineral resources contained in the bill. In the section on Codes of Fair Competition the amendment would give the President authority to grant codes:

"(d) to industries engaged in the extraction of limited natural resources where the President finds: (1) that unregulated competition has caused and will cause serious waste of an irreplaceable resource; (2) that stabilization of supply and demand by control of production, price, and capacity will aid in reducing waste; (3) that the proposed code contains such additional provisions for the improvement of technical standards and the elimination of wasteful practices as seem to him reasonably attainable; and (4) that the proposed code contains provisions for the fixing of maximum prices, if necessary, by a public authority sufficient to protect consumers against unreasonable advance in price."

The present NIRA law and the Harrison bill, together with most discussions of them, include mentions of natural re-

sources which indicate a recognition of the necessity for some sort of special treatment, without specifying what it should be. The same is true of current discussions of the anti-trust act. We have merely attempted to segregate this problem and to state specifically the meaning and purpose of any exceptional treatment which might be granted to exhaustible natural resources. This should enable the coal and oil industries to attempt cooperative efforts under the NRA, even if their special legislation, now pending, does not pass.

In a later part of the Harrison bill provision is made for mandatory imposition of codes on natural resource industries where the President is convinced that there is good cause. Our committee has not recommended such a provision. Its enforcement would lie largely with the police powers of the state, and the relations of these powers to Federal power is far from clear. In any case there seems to be much more promise for success in voluntary cooperation of the industry. However, I think it a fair assumption that every postponement of such voluntary cooperation by the industries, involving continuance of waste and anti-social conditions, enhances the possibility that the public may some day think it necessary to impose control more or less independent of the wishes of the industry.

The question of production, capacity, and price control is now a subject of keen controversy in several of the mineral industries, as I need not tell this group. The coal industry, under its code, has tried indirect control of pro-



duction through price fixing. This has had some measure of success, but results are so far from satisfactory to much of the industry that many new proposals are coming forward to the NRA and to Congress. The Guffey bill is one. The copper code contains provisions for production control which have helped to lower stocks. The copper industry, through the United States Copper Association, opposed the Harrison bill for the reenactment of the NRA, but in a communication to the Senate Finance Committee favored the enactment of some kind of legislation which will permit voluntary cooperation, particularly with reference to production and liquidation of surplus stocks. It suggested that the legislation necessary for this purpose, whether enacted independently or as a component part of legislation extending the NRA, take a form similar to that of the Capper-Volstead Act of 1922 applying to agriculture, which permits collective action for processing, preparing for market, handling and marketing in interstate and foreign commerce. The oil industry has had production control under the Oil Administration Section of the NRA, and seems to be agreed that some kind of production control is necessary. There is, however, wide difference of opinion as to the plan. The Oil Administration wishes to strengthen the present act through a bill now pending in Congress. The majority of the oil industry is opposed to this plan and looks for the solution in an oil states compact, which would need to be legalized by congressional action. This would in effect be the revival and strengthening of the old Oil States Advisory Board, which was far from successful in its efforts. The Connally act recently passed prohibits the interstate shipment of oil produced in violation of state law. The zinc industry has a highly ineffective provision for production control in its code, but is now considering, through a committee of the American Zinc Institute, the possibility of developing a more adequate plan.

I think that I do not go too far in saying that the mineral industries with surplus troubles are moving definitely toward agreement as to the necessity of production, price, and capacity control, and that this movement is gaining impetus. May I express my personal view also that in view of the history and present trends in these industries, this movement is an inevitable one. Our committee believes that it is in the right direction, and has gone definitely on record in favor of permissive legislation which will keep the door open for such experiments. However, the competency of our committee, because of the purpose for which it was organized, does not extend to passing judgment on the merits of the many plans which are now coming forward. Only the industries themselves can do this job effectively. Whether the NRA is ended in June, or ten months later, or two years later, the time is none too long for the formulation of any well-considered plan for legislation of a more permanent nature.

#### POLICIES ADAPTED TO THE "DEFICIT" GROUP OF MINERALS

I now turn to another group of minerals with quite different kinds of problems. I refer to the list of upwards of 18 minerals in which this country is more or less deficient, and for which we are dependent on foreign countries for one reason or another, such as total amount, location, inferior grades, excessive cost, etc. For this group, which, for convenience, may be called the "deficit" group, we recommend encouragement of exploration and development by government. Private industry has done what it could, but there are many problems, such as exploration, sampling, testing of processes, etc., more or less outside of the commercial range, which could and should be supported by state and federal governments in the interest of national self-sufficiency and defense. For instance, it is known that this country has very limited supplies of high grade manganese but very large supplies of low grade manganese ores. Manganese is one of the very important key minerals for national defense. We ought to know more about the domestic possibilities for manganese production than we do—about the nature and amount of the low grade reserves, about the possibilities of finding new processes for their recovery, and about the real cost. During the past war we paid five times the normal price for our manganese. What reserves have we today that might possibly be made available at successive price levels? The War Department would like very much to know. The government's success with potash and helium suggests further efforts of this kind.

A temporary phase of this problem—at least we hope it is temporary—is the possibility of using relief funds on this group of minerals. They are widely scattered through many states. The Geological Survey and the Bureau of Mines and various state planning agencies have developed practicable plans for the use of relief money and the care of stranded mining populations in work on this group of minerals. We have emphasized the desirability of limiting expenditures to this group, as well as to gold and silver (for which there seems to be an unlimited market), and not to extend them to the "surplus" group of minerals, where new development would merely add to the social and economic troubles. I may say that this discrimination is not apparent in many of the state plans or in the vast number of projects which have been submitted to Washington. A copper-producing state naturally thinks of possibilities of developing more copper; a coal-producing state thinks of coal. Yet in most of these states there exist possibilities for mineral exploration which would not add to our surplus troubles.

#### OTHER PHASES OF DOMESTIC POLICY

There are other phases of the domestic mineral policy touched on by our committee, but I will not have time to do more than mention them. There seems

to us to be a good case for extending The Leasing Act over the remaining minerals on the public lands, except in Alaska. Federal and state taxation policies present some inconsistencies to any broad national program of conservation, and some of the state policies are clearly influenced by the idea of nationalization of resources. On the question of monopoly it is our view that competition is a healthy condition in general, but, as I have already indicated, where unrestricted competition can be definitely shown to have anti-conservational and anti-social effects of public concern, we favor the allowance of cooperative efforts which may take on the aspects of monopoly, but under government supervision. Minerals are everywhere subject to the police powers of the states, and a review of the hundreds of laws, many of them called conservation laws, enacted under these powers, shows a highly chaotic condition. Also there is the ever-pressing problem of the relation of state police powers to the federal powers, as illustrated by the present oil situation. There is immediate need for a systematic survey of this problem, first, to bring together the facts, and, second, to ascertain whether there may not be a more consistent program of legislation toward which both the state and federal governments could work.

Finally, there is urgent need that the scientific, technological, and fact-finding services of the government and the states be supported and strengthened. These have never had encouragement commensurate with the importance of the industry they serve. Parallel services in the Department of Agriculture have financial support fifty times greater than that given to minerals, and yet the total value of the annual output of agriculture is only twice that of minerals. The support of the mineral agencies has been seriously cut down during the depression, at a time when the demand for their services is especially acute, and we now face what seems to be a period of planning activities and cooperative efforts without anything like the statistical and technological information which we ought to have and, what is more important, without public organizations built up to an efficiency which will enable them to answer the many important questions which are already crowding upon them, both from the industries and the public.

It may interest you to know that a committee of the Science Advisory Board, at the request of Secretary Ickes, has made a report on the question of mineral economics and statistics, and has recommended consolidation of many of these services now scattered through various organizations in Washington. It also has pointed out some of the gaps in existing information that should be filled. An important example of this is the lack of adequate information on scrap. The report was approved by the Central Statistical Board and by Secretaries Ickes and Roper, and the first step has been taken, under presidential

authority, by transferring the Minerals Division of the Bureau of Foreign and Domestic Commerce to the Economics and Statistical Branch of the Bureau of Mines. Mr. J. W. Furness, formerly of the Department of Commerce, has assumed direction of this branch. Reorganization of the branch is now under way, but is very greatly hampered by limitation of funds.

It is the view of our committee that the Bureau of Mines and the U. S. Geological Survey should be primarily fact-finding services, working independently of administrative agencies touching the business of minerals, and that the statistical and fact-finding work should not be scattered or duplicated among the various administrative agencies. The Oil Administration and the NRA have built up large fact-finding services, and have drawn largely on the personnel of the Bureau of Mines and the Geological Survey for this purpose, weakening these organizations, dispersing the record, and emphasizing certain temporary requirements for special information at the expense of a well-rounded program. Further duplication is threatened by the Guffey coal bill and the McReynolds tin bill, which provides for a Board of Strategic Minerals. The Bureau of Mines should be in a position to supply necessary statistical information to the Oil Administration and to the NRA, but at the same time it should be prepared to meet miscellaneous requests which come in from the State Department or the Tariff Commission or the War Department or from Congress. If administrative duties are loaded on the fact-finding organizations, it is inevitable that the program will be seriously distorted by the daily necessity to meet special and temporary requirements.

#### FOREIGN POLICY

Any domestic program is obviously incomplete which does not take account of our imports and exports. No country, even our own, is self-contained in regard to minerals; we do not live in a vacuum. Even if the international movements of minerals are small in volume, they greatly effect domestic markets and standards of operation. Seldom do all the interests within a mineral industry coincide in regard to foreign policy, and of course the same is true for the different mineral industries. Only a few generalizations seem possible in attempting to outline a general foreign policy.

In the absence of adequate domestic supplies, imports of upwards of eighteen industrial minerals are necessary. For this group of minerals as a whole, tariffs which have been imposed for the purpose of developing domestic supplies have not accomplished the desired result. In view of this fact, our committee makes the suggestion that instead of depending exclusively on tariffs we try direct government expenditure for a time, as likely to bring better results, and get what advantage we can from trading our necessary imports for foreign

markets for other commodities. Most other countries are following just this course to advantage. As I have already indicated, present emergency expenditures may be directed toward developing our deficit minerals. Several of these minerals are important for national defense, and this consideration alone warrants a more direct attack on the problem of development than has been attempted in the past through the indirect method of tariffs. The urgent request of the Army and Navy for emergency stocks of key minerals and for more precise information as to what may be done with our doubtful reserves in an emergency, should not go unheeded.

For the deficit group and perhaps for other minerals, attention is also necessary to the question of control of scrap exports, which recently have become very large, mainly because of war preparations of certain foreign countries. Ours is the only industrial nation that exercises no control over such exports.

For the minerals existing in this country in more adequate quantities, or in surplus, tariffs have been necessary and beneficial, but even these tariffs have not in themselves solved all the troubles for which they were designed, as illustrated by the recent coal, oil, and copper tariffs. It is our belief that domestic stabilization of the industry along the lines I have previously outlined is a necessary prerequisite to the formulation of an intelligent tariff policy for the group of industries suffering from surplus troubles. Once a domestic mineral economy is set up and stabilized, it should be possible to judge more accurately the size of tariff necessary to protect it. One is the complement of the other.

Our committee also calls attention to the fact that most other countries employ more flexible and selective methods to control imports than we do. Quotas, embargoes, sliding scales, tariffs, and exceptions for particular grades, are freely and effectively used. The lag in adjustment of tariffs to meet change in conditions in this country often extends long after the emergency is passed. Any such improvement in our economic weapons of defense will perhaps intensify the battle of economic nationalism for the time being at least, but it can hardly be avoided if we are to hold our place in world affairs. My own belief is that the difficulties created by economic nationalism will have to get worse before they can be better; that economic nationalism will have to go to absurd limits before the world will recover its sanity and rebuild international trade along necessary and reasonable lines.

In considering our foreign policy, also, we should not forget that the American mining industry has established wide interests in foreign fields which are of concern to our public. Attention to this problem on the part of our government is much more necessary for the future than in the past, for the reason that the "open door," for which our country has so long stood, has been rapidly closing all over the world. Nationalization of

mineral resources, in one form or another, has greatly restricted our activities abroad. Also other governments are rapidly extending their direct interests in the mineral business in a manner which makes it difficult for private American capital to compete. This is a long, complex story. Probably there is not a great deal we can do about effecting the general result, but there is immediate need for the definition of our rights abroad and negotiation for their protection. The State Department does what it can in individual instances, but its hands would be greatly strengthened if it could proceed on the basis of a well thought-out policy.

In the past the United States has exported a considerable surplus of minerals, particularly oil and copper. Exports have now dwindled almost to a disappearing point, because of foreign competition. Also it is now beginning to appear that total supplies of minerals in the United States (except coal) are not sufficient to warrant the encouragement of large mineral exports as part of a national policy. However, so far as export continues, it is necessary that there be a continuation of the right, conferred by the Webb-Pomerene Act, of industries to cooperate in foreign marketing. Participation in international cartels is also desirable. Where cartels control minerals which the United States must import, as in the case of tin, proper defensive measures for price protection should not be left entirely to the industries concerned. Cartels in general are rapidly taking on a political aspect through the participation, in one form or another, of foreign governments in the mineral business, which will make it increasingly necessary for the United States government to take an active interest. Just as combination in the domestic field is usually accompanied by extension of political control, international combination, through cartels and other agreements, will require the evolution of political procedure to keep their activities within proper bounds.

Closely related to the subject of cartels is the question of economic sanctions and boycotts for the purpose of preserving peace, which have come in for so much international discussion since the war. At the Paris peace conference the British put forward the proposal that exportable surpluses of key raw materials, including several minerals controlled by the allies, be distributed to the Central Powers as mutually agreed, as a guarantee of the observance of peace terms. Since then the same idea has come forward in one form or another through the proposals of Hurley, Senator Capper, Sir Thomas Holland, and others.

Another question grows out of the recognition of the fact that nature has distributed mineral supplies and other raw materials very unequally among the nations, a recognition that has come mainly since the Great War. The question is whether international movements of these minerals could or should be internationally controlled, in order to provide

(Concluded on page 52)

# Wheels of

# Government



**T**HE fast moving wheels, and the steady escape of steam of the heavily laden Congressional-Legislative train, which was working up power for the last long pull over the Legislative Hill, came to an abrupt stop, temporarily, with the Decision of the United States Supreme Court declaring The National Industrial Recovery Act unconstitutional.

The order for full speed ahead had been given, and Congressmen and government officials were bending every effort to get the President's desired legislation transmitted into law. One of the first items on that list was the continuance of NRA for a two-year period.

The decision called an abrupt halt in the program. The suddenness of the stop threw Washington into bewilderment from which it has been gradually emerging with new plans and new proposals which would seem to indicate that whatever fences there are "back home" will have to mend themselves, for Congress may be with us indefinitely. The constitutionality of the proposed legislation now before Congress has involved many of the pet projects, including the Wagner Labor Disputes Bill, and other labor legislation. Undoubtedly an effort will be made to salvage as much of the NRA as the Decision permits, and it is anticipated that the Administration will shortly make known its plans in this direction.

Following the close of the investigation of the NRA under the Nye-McCarran resolution, the Committee on Finance of the Senate considered the Harrison-Richberg bill, which provided for a strengthened NIRA with a two-year life from June 16, 1935. On April 26 a series of amendments were introduced by Chairman Harrison of the Finance Committee which in effect would have reaffirmed the full force of the anti-trust laws except that they would still permit members of industries to confer and co-operate in the preparation of codes and in observing code provisions. The amendments would prohibit regulation of production except in "exceptional industries (including natural resource industries) and in emergencies to prevent and to correct, under governmental control, a

depression in a trade or industry resulting from production in excess of effective demand." The amendments would prohibit regulation of prices "under governmental control in those natural resource industries which are not otherwise subject to such governmental regulation, but which are found to be so affected with a public interest that such a regulation is necessary for the protection of the public interest"; would require that no trade or industry committee be designated by any term, such as "code authority," indicating the possession of governmental power or authority, and that no powers of administration be delegated by the President to any such committee; would empower the Federal Trade Commission to issue "cease and desist orders" wherever it finds destructive, oppressive or discriminatory price cutting." It is apparent that within the Committee on Finance the objections so strongly voiced during the public investigation prevailed. On May 2, the Committee reported Senate Joint Resolution 113 as a substitute for the Harrison-Richberg Bill. The resolution provides in effect as follows:

1. Extension of Title I of the NIRA to April 1, 1936.

2. Prohibition of price-fixing under the provisions of any code except "that provisions for the regulation of prices under governmental control may be included in codes for those mineral natural-resource industries in which prices are now fixed pursuant to the provisions of any code and which the President finds to be so affected with a public interest that such regulation is necessary and proper in the public interest."

3. "No code of fair competition shall be applicable to any person whose business is wholly intrastate."

4. Review by the President of all present codes in order that such codes may be made to comply with the requirements of the Joint Resolution. All such codes would be continued in effect

for a period of thirty days after June 15, 1935, unless previously reviewed and superseded. No such code would continue after the expiration of such thirty-day period unless reviewed and approved by the President within that period with a finding that in the form approved it conforms to the requirements of this Joint Resolution.

On May 14, S. J. Res. 113 passed the Senate and was referred to the House of Representatives and to its Committee on Ways and Means. The Committee on May 20 began hearings on the resolution and also on House Joint Resolution 295 introduced as a substitute measure by Chairman Doughton (Dem., N. C.). This measure provides an extension of the codes to June 16, 1937; the President is authorized and directed to approve or prescribe codes of fair competition; no code to be established for any trade, industry or subdivision thereof which is not subject to the federal power to regulate interstate and foreign commerce; no price fixing by concerted action, excepting such provisions as the President shall find necessary in the public interest in order to prohibit discriminatory price cutting or to otherwise protect small enterprises against discrimination or oppression, or to deter the growth of monopolies or to prevent the waste of mineral resources; further provided that no person shall thereby be prevented from selling goods or services, between customers at a fair competitive price; codes to contain provisions establishing minimum rates of pay, maximum hours of labor, the requirements of Section 7(a) and prohibition of child labor; the Federal Trade Commission is authorized to issue "cease and desist orders" upon findings by the President that members of a code are engaging in unfair methods of competition; fine of \$500 for each offense, each day of violation of code provisions constituting a separate offense; exercise of governmental authority in administration and enforcement of codes rests solely in public officers of agencies of the Federal Government; President to review for compliance with the requirements of H. J. Res. 295 every code now in effect; such



codes to continue for six months, but not thereafter unless the President has reviewed and approved. Appearing at the hearings which terminated on May 24 among other representatives of industries were five operators from the bituminous coal fields of West Virginia, Alabama, Ohio, and the states west of the Mississippi River. With the exception of the representative from Ohio, these operators endorsed the accomplishments of the NRA in stabilizing the situation of the bituminous coal industry. The Ohio representative told the committee that the NRA had exercised a constructive influence but that it was not alone sufficient to the needs at the present time and that additional special legislation is required. The Committee on Ways and Means was prepared to report H. J. Res. 295 on May 27, but the decision of the Supreme Court of the United States on that day in the Schechter poultry case (discussed elsewhere in this issue) has indefinitely delayed the report. The Supreme Court decision has further either caused recommitment or has created a marked state of uncertainty in the case of AAA amendments, the Wagner National Labor Relations Bill, the Guffey federal coal control bill, the social security bill and the Black 30-hour week bill.

The Lewis-Doughton Economic Security Act, H. R. 7260, previously passed by the House of Representatives and under consideration in the Senate Committee on Finance, was reported May 16 in a form embodying the views of the President's Committee on Economic Security. The voluntary annuity feature was restored in committee following a personal appeal by Representative David J. Lewis (Dem., Md.), who originally drafted and introduced the measure with Senator Wagner. It permits the sale by the Federal Government of voluntary annuity policies paying as high as \$100, in the end providing that no policies are to be sold for less than \$60 a year. Other changes in the bill as reported by the Committee on Finance are as follows:

(1) A new title appropriating \$3,000,000 for the next fiscal year and necessary amounts thereafter, to enable each state to aid the needy blind;

(2) The Social Security Board, set up to administer the Act, is transferred to the Department of Labor;

(3) Jurisdiction over grants to states for aid to dependent children is transferred from the Social Security Board to the Children's Bureau of the Department of Labor;

(4) States are permitted to establish unemployment insurance systems on an individual or company reserve plan (La-Follette amendment) instead of a state "pool fund" basis as provided by the House;

(5) To stimulate steady employment, employers who have stabilized their employment are permitted an additional credit against the Federal tax.

As noted above the economic security bill is now in a status of uncertainty

because of the Supreme Court decision referred to above.

The Public Utilities Act of 1935, S. 2796, was reported by the Senate Committee on Interstate Commerce on May 13 and is now on the Senate Calendar for early consideration. It is, in its present form, a "dissolution" rather than a "regulatory" bill. Of pointed interest to mining operations is Section 3 (a), a new embodiment entitled "Power to make particular exemptions regarding holding companies, subsidiary companies and affiliates." This section directs the Commission to issue rules, regulations or orders to exempt any holding company and every subsidiary company thereof, if and to the extent that the Commission deems the exemption not detrimental to the public interest, if—such holding company is only incidentally a holding company, being primarily engaged or interested in one or more businesses other than the business

#### THE HATCHET MAN!



—The Pittsburgh Press

of a public utility company and (A) not deriving, directly or indirectly, any material part of its income from any one or more subsidiary companies, the principal business of which is that of a public utility company, or (B) deriving a material part of its income from any one or more such subsidiary companies, if substantially the outstanding securities of such companies are owned, directly or indirectly, by such holding companies. The Commission further reserves the right to investigate and review or modify the application of the above. In the House of Representatives the hearings on the companion measure, H. R. 2543, were closed April 16 and the bill has been under the advisement of the Committee on Interstate and Foreign Commerce since that time. The subcommittee considering Title I, the title of particular interest to mining operators, is composed as follows: Rayburn, Texas; Huddleston, Alabama; Pettingill, In-

diana; Eicher, Iowa (Dems.); Mapes, Michigan; Wolverton, New Jersey (Reps.). There is a controversial situation in the subcommittee and in the full committee with reference to the "dissolution" or "regulatory" form which the bill shall take.

The Wagner National Labor Relations Act, S. 1958, was reported by the Senate Committee on Education and Labor without material change from the original form on April 29. On May 16, this bill passed the Senate by a vote of 63 to 12. Proceeding thence to the House it was reported by the Committee on Labor on May 20, but has not as yet been granted a rule for placement on the House Calendar. The further disposition of this bill is in the hands of the administration and there is some indication of a trend to embody a part of its features in the rewritten NIRA now made necessary by the momentous Supreme Court decision in the Schechter case. There is definite opinion that the National Labor Relations Act as such is now to be held as unconstitutional, but this opinion will not prevent the enactment of the bill if the administration desires it. The passage of the Wagner Bill would intensify the activities of the national labor unions and many harmful precedents in labor relationships would become firmly established before its constitutionality could be tested. This has been clearly demonstrated in the application of Section 7 (a) in the last two years.

The Guffey Federal Coal Control Bill, S. 2481, now on the Senate Calendar, was the subject of meetings of coal producers on May 20 and 27. The producers present numbered 201 and purported to represent 175,500,000 tons of production of bituminous coal. The expression of the meetings was to the effect that special legislation was essential to the stabilization of the coal industry and that a revised Guffey bill was the answer to the needs of the industry. This revision, disturbed somewhat by the Supreme Court decision on the NRA, is being developed and the committee of 20 coal operators, chosen by the meetings, is instructed to present the revised Guffey bill for enactment at this session of Congress. Involved in this situation is the threat of the bituminous coal mine workers to carry out a nationwide strike on the 17th of June, thereby creating the problem of a national emergency for solution by the administration.

The Interior Department Appropriations Bill, carrying an increase of \$553,000 for the United States Bureau of Mines over the appropriations for the fiscal year 1935, and an increase of \$972,060 for the United States Geological Survey over the fiscal year 1935 was approved by the President on May 9. It is encouraging to find the Houses of the Congress and the administration viewing constructively the vital need of the nation for increased attention of the improvements of its mineral industries.



# Of all things...

**T**HE score is again even between the legislative and administrative departments. . . . Congressmen and Senators chortled with high glee recently when they received a message from the President asking that a duplicate of a bill which they had passed a few days before authorizing a bond issue by the city of Ketchikan, Alaska, be authorized. . . . The reason: the bill has been lost. . . . A letter from Secretary of Interior Ickes appended to the President's note sadly explained that somewhere in the vast maze of the Interior Department, the original bill had disappeared. . . . With laughter and broad hints at downtown departmental efficiency, the House and Senate rushed through within a few minutes a resolution to remedy the situation. . . .

The Ketchikan bill was the second "lost" in the history of the nation. . . . A minor War Department bill went astray about 50 years ago and was never found. . . . But it isn't the first time that the Congress got around to passing a bill after the need for the measure was gone. . . . Not so many years ago a private pension bill was enacted which placed on the pension rolls a man who had been buried 10 years previously and who had left no heirs! . . .

Like Antonio, Uncle Sam also has his Shylock. . . . And, like Shylock, it insists that the letter of the bond must be fulfilled. . . . In 1904 another Roosevelt executed a bond with Panama providing it be paid an annual rental of \$250,000 . . . in gold dollars . . . for the land comprising the Canal Zone. . . . A few months ago when the yearly rental was due, the U. S. promptly sent a check for \$250,000. . . . Panama politely, but firmly, refused. . . . They pointed to the bond . . . that it specified gold dollars . . . and that gold dollars it would accept. . . . Panama didn't doubt that devalued dollars were all right, but it preferred the old reliable eagle of other days. . . . The Treasury was stumped. . . . there have been conferences and conferences. . . . But Panama still sticks by the bond. . . . The rent is past due, and although Panama isn't threatening eviction, the situation is ticklish. . . .

The fact that U. S. citizens hold \$11,000,000 in Panaman bonds on which the interest won't be paid until Panama gets its rental may prove a determining factor. . . . One thing is sure . . . the matter won't get to the Supreme Court. . . . And another thing is probable . . . Panama will get a better "break" than U. S. citizens who hold gold clause securities. . . .

With the new work's relief set-up in swing, there will be scattered throughout the nation 3,195 branch offices of the alphabetical agencies of the Government. . . . And that doesn't include the 3,000 CCC camps. . . .

Treasury Secretary Morgenthau has been the subject of some good-natured kidding recently. . . . The entire front

lawn of the Treasury Building has been dug up to facilitate the installation of an air-conditioning system for the huge Treasury Building, badly in need of cooling in the torrid summer days of Washington. . . . The wiseacres say the cooling system is for the vaults to prevent undue expansion of the currency. . . .

No other President in the history of the nation has ever received as much personal mail as the present occupant of the White House. . . . President Roosevelt likes it. . . . Many of the letters he reads himself. . . . Most of them are answered by the secretarial staff. . . . A recent one, however, stumped even the President. . . . It read:

"Dear Mr. President: I have raised twelve children, and with your help I would like to start all over again."

Washington efficiency: Secretary of Interior Harold Ickes (in shirt sleeves during a recent warm day) strode into a subordinate's office.

"Is Mr. W—— in?" asked Mr. Ickes politely.

"Who wants to see him?" queried a pert, gum-chewing secretary.

"The Secretary," answered the Secretary of the Interior.

"Whose secretary?" asked the secretary sharply.

P. S.—Mr. Ickes got in.

The New Deal has not been in vain. . . . Everybody knows the alphabet now. . . .

When this depression hit, the RFC was going to save the country. . . . Then along came the NRA as the people's new idol. . . . When that god turned out to be a slow producer, the fast-working CWA got on the job. . . . It was too lavish for even the New Deal, so FERA was placed on the pedestal. . . . Now all eyes are looking toward WRC (Work Relief Council) as the "Open Sesame" to prosperity.

Opponents of Huey Long and Father Coughlin in the Senate the other day suggested a resolution to investigate the financial connections of the two would be pertinent.

Some of the Senators seem to think that the Louisianan and the Detroit radio priest are connected with the Western Union and Postal systems. . . . The reason: more than 100,000 telegrams to Senators alone on the bonus bill . . . nearly that many to the White House. . . .



# Promotion of Safety

## in Mechanized Mining in Illinois

By EDWARD LEMING and E. F. STEVENS\*

**T**HE property at which this plan has been in use is one of the first of Illinois properties to adopt mechanical loading. Before, during and after the gradual adoption of 100 percent mechanical loading, the accident history of the property was not satisfactory. With the adoption of new methods of operation and the increased necessity for interlocking operations underground arising from mechanical loading, no improvement in the accident record was attained.

Foremen's meetings on safety have been held for years at this property. Bulletin services have been used and on two occasions in the last few years 100 percent of the employees have been put through rescue work courses of the Bureau of Mines with the assistance of the Bureau as a further means of attempting to promote safe operation. In spite of all of these measures used, the accident records continued to be unsatisfactory from the standpoint of fatalities suffered and the number of major injuries, both of which undermine the safety morale of the organization, and gradually lead to a feeling of uneasy and constant anticipation of further fatalities or major injuries.

Because of this history this property undertook to evolve some new and supplementary idea of promoting the cause of safety, not with the thought of supplanting regular recognized means of safety work, but rather with the thought of supplementing these established means, which are still in use at this and other properties.

This plan is based on the extremely simple thought of offering to share any improvement over long established average accident costs with the employees responsible for the improvement. It accomplishes this simply by paying in money to employees and foremen who work safely, their half of the savings.

### SIZE AND TYPE OF PROPERTY

The property consists of a shaft mine of about 5,000 tons per day production, employees underground and on top approximating a total of 500 men.

\*Union Colliery Co. †Presented at American Mining Congress Convention, Cincinnati, Ohio, May, 1935.

Coal is loaded exclusively by mobile types of loading machines, haulage by electric motor, and preparation is accomplished in a shaker screen boom equipped modern tippie permitting sizing and loading of the various ordinary commercial sizes.

Coal is mined from the No. 6 seam of Illinois and the underground conditions are neither the best nor the worst in the state, though they are perhaps slightly worse than the average.

### GENERAL FEATURES OF PLAN IN USE

Originally it was intended to organize the entire force into teams and pay periodically to winning teams a fixed prize in money. This quickly proved to be impractical for numerous reasons and was replaced by present plan now in use.

History of the property over several years indicated a fluctuating cost of accidents ranging to as much as 10 cents per ton produced, with an average figure approximating 5 cents for a number of years. This cost included actual compensation paid, medical and hospital expense of accidents, maintenance of first aid room at which a doctor is in daily attendance at quitting time of the day shift for dressing any slight injuries which might otherwise lead to infective lost time cases, as well as for attention to convalescents of a more serious nature. Also is charged against the 5-cent average cost all expense of examinations, legal and medical expense in connection with compensation hearings.

Under the plan in operation the entire working force is organized into teams headed by foremen, the actual total cost of accidents is figured as before, and any savings on total accident costs determined during a contest period is divided 50 percent to the winning team or teams and 50 percent to the company. Of the money which goes to the winning teams 15 percent is paid to the winning foremen, share and share alike, and 85 percent to the men on the same basis.

This distribution between foremen and men is on the simple arbitrary assumption on our part that the men are 85

percent responsible for the decrease in accidents, and are therefore entitled to 85 percent of the share of all employees. We do not maintain that this percentage can be established with any accuracy. We do believe on the contrary that no plan which rewards only the foremen can hope to attain the attention or success of a plan which recognizes the individual contribution of the individual employee.

### DURATION OF THE CONTESTS AND PAYMENT OF PRIZES

A great deal of thought and study was put in on this question. The object of the contests being to *maintain* interest in safe work it was obvious that too long a contest would defeat the very purpose of the contest if one or two teams out of the 17 in the contest suffered a serious accident early in any period and hopelessly lost any chance of winning. In such an event the total record might prove to be a poor one due to loss of interest of a few men out of many, if the contest period be unduly prolonged. On the other hand too short a contest does not permit the accumulation of sufficient prize money to make winning something to definitely strive for, and the object of this plan was definitely to make the prizes financially worth winning.

The decision was reached to use a three months' period for each contest so that every one starts with a clean slate and a new chance each three months. This decision has been found to be a wise one. Payment is made by check by the 20th of the month following close of contest.

### ORGANIZATION OF TEAMS

Under this property's operation the division of the force into teams is as follows:

11 teams—of loading machine crews determined according to the foremen to which the men report.

1 team—Main line transportation men.

1 team—Night material men.

1 team—Mechanics.

1 team—Wiremen and extra gang.

1 team—Topmen, including yard and shop but excluding tippie.

1 team—Tippie crew.

17 teams—Total.

## PRACTICAL RULES OF APPLICATION

Obviously, in the necessary shifting of individuals in such a mine, and by the size and complexity of the work engaged in, it has been found necessary to develop certain practical rules for the equitable administration of these contests.

Certain of the rules developed by our experience follow, other rules and other team division or organization may of course be necessary for different types of mine operation.

1. Teams and foremen are charged with man-hours lost due to accidents or for injuries which are compensable (according to the compensation awarded) whether or not actual work time is lost.

2. Ratings in charges for time lost depend on number of men on the team and hazard of employment. Following are ratings per man-hour actually lost as used at this property.

	Man-Hours lost
Goodman 1 and 2 .....	1
Goodman 3 and 4 .....	1
Goodman 5 and 6 .....	1
Joy 1 and 2 .....	1
Joy 4 and 9 .....	1
Joy 3 and 10 .....	1
Joy 3-A and 10-A .....	1
Joy 5-A and 6-A .....	1
Joy 7 .....	2
Joy 8 .....	2
Main Line men .....	$\frac{3}{4}$
Night material men .....	$\frac{3}{4}$
Mechanics .....	$1\frac{1}{2}$
Wiremen and extra gang ...	1
Top yard and shop men .....	$2\frac{1}{2}$
Tipple Men .....	$2\frac{1}{2}$

In further explanation of the above tabulation it may be said that for this operation standard loading machine crews are used as a base—small crews, haulage and other operations entailing as they do substantially less or substantially greater hazards, are either penalized for each man-hour lost or less severely charged as indicated in the tabulation.

3. A committee composed of the Superintendent, Mine Manager, Assistant Mine Manager and Chief

Clerk shall settle all questions arising because of specific questions not covered by the rules.

4. The company reserves the right to distribute prize money to 2, 3, or more winning teams with the understanding that all prize money earned will be distributed. The exact proportioning of distribution will depend on amount distributed and records of teams in the contest. (Note—this rule is to reserve the right to distribute the money to as many teams as the company wishes to declare winner and to prevent the possibility of a small group of men obtaining a large amount of money, which in fairness should be further divided.)

5. Each foreman is responsible for his men from the time they enter the mine until they are outside again.

6. All compensable accident cases which have not been settled at the close of a contest shall be estimated by the committee, and the estimated compensation in terms of weeks shall be reduced to man hours and charged against the proper team and foreman at the end of the contest period in which the accident occurred.

7. When a man is injured to the extent that he must work on a job other than his regular occupation, a penalty of one hour for each day on such job is charged.

8. Any man coming out of the mine on account of an injury will be charged for the hours lost provided he is unable to resume work after medical care.

9. When a man on the extra gang is injured and loses time this loss will be charged against the foreman he was working for at the time of the injury, also against the extra gang team.

10. If a man is injured while working on an idle day and not on his regular territory, the injury will be charged against the foreman in charge of the work at the time of the injury but the injury will not be charged

the extra gang team, but not against any foreman. This rule applies only to the wire men in the extra gang team.

12. Each week a sheet is to be posted on the bulletin board showing the standing of each team and each foreman, for the previous week and the contest to date.

13. All grievances or cases arising out of disagreement on the standings as posted, or injuries as charged, will be heard before the committee and the committee ruling shall be final and binding.

## GENERAL RESULTS AND COMMENTS

To date 11 three-month contests have been completed, in all except one of which the contests have shown savings and resulted in prize money distribution.

A total of about \$24,000 has been paid to winning team members and foremen, this sum representing half of the savings over average prior experience. Prizes have been shared by from 118 to 357 men in various contests and have amounted to more than \$20 per winning man in some periods.

Our original belief was that in introducing these contests results would show one winning team with perhaps a second or third runner-up in time loss. The actual record has been that out of the 17 teams in each contest, from 4 to 10 of these have come through the period



to any team. But in case the injured man's team wins he will not be allowed to share in the money.

11. Should a member of the wire gang be injured during a contest, such injury will be charged against

without any time lost or accident cost. The result has been that the company has not been called upon to determine a first, second and third prize winner, but only to distribute the money saved, to teams with a perfect record.

The constant determination and consistent interest shown by these men and foremen have satisfied this company the plan is well worth while in its operation.





# SAFETY in Mechanized Mining<sup>†</sup>

By G. N. McLELLAN\*

**W**E are all familiar with the slogan "Safety-First." Perhaps the man who originated it knew what he was talking about. Thousands of us who follow him didn't grasp it for a long time.

I am sorry to say that there are still many plants in this country that do not consider safety first. In many cases management is content and interested only in taxes, tonnage, costs, freight rates, depletion and kindred subjects. They believe that profit making and accident prevention do not go hand in hand. They are afraid if too much care is taken, production will be slowed up; they are afraid that if machines are guarded too closely the speed of operation will be hindered. But they discount the greatest factor in production to-day—the human element.

It has been proved conclusively that there can be no efficiency and economy without safety, for somebody pays when safety is lacking. Every safety device pays dividends; every safety application evaded is an assessment and a loss.

It has been proved beyond any question that an intensive and continuous Safety Campaign brings results in accident prevention. It has further been proved that 100 percent cooperation from the management as well as from every employee, is necessary to bring about these results.

If we realize that an industry without accidents is not something imagined today and achieved tomorrow, we will have taken a vital step toward our common goal. A mine free from accidents can only be achieved when each individual, either through enforced training or individual initiative, has learned to do his job safely and has done it so often that the safe way becomes a habit.

A coal mine plant is very much like a military unit: it is no better than its leadership. If an executive is lax, the entire organization under him reflects that laxity. If an executive is exacting, but just in his demands upon his subordinates, his organization is the very mirror of efficiency, willingness and precision.

The Wildwood Mine of the Butler Consolidated Coal Company, located in Allegheny County, Pennsylvania, 15 miles north of Pittsburgh, was designed for mechanical operation. It was evident

that a project of this kind would take a large investment in safeguarding, by which not only the property would be conserved, but also, and above all, the lives of the employees. Not only was the equipment installed made to comply with the laws and regulations of the State of Pennsylvania, but care was taken to exceed these wherever it seemed that greater safety could thus be attained.

The Wildwood Mine operates in the thick Freeport seam, which averages about 8 ft. in thickness. The seam consists of two parts, a top bench and a lower, which is separated by 12 in. to 14 in. of bone coal; cover averages 350 ft., with a black slate top immediately over the coal seam and a hard fire clay bottom.

In the projection and development of the mine workings, much consideration was given to the problem as to the manner in which every electrically-operated underground unit that would or might leave the main-line haulage would be assured of continuing in a well ventilated area. The mine is ventilated by a 7 by 11 ft. primary exhaust fan, which is designed to deliver 300,000 cu. ft. of air per minute against a water gage of 3 in. at a speed of 140 r.p.m. At the present time, our fan is putting out 176,000 cu. ft. of air per minute, against a water gage of 1.6 in. and at a speed of 110 r.p.m.

Mechanized loading requires radical changes from hand methods, and men accustomed by long experience to hand mining practices do not automatically fit into a machine operation. It takes time for them to adapt themselves to the machine requirements, and while this is a slow and costly method for the company, a high degree of safety and efficiency could not be expected from the operating crews unless they received some amount of training or instructions. While the first car of coal was taken from the mine on December 5, 1928, which we might say was the official opening of the mine, the Wildwood Mine continued operations from that date to March 1, 1930, before the thought was given to the forming of a Safety Department.

While my paper deals with safety in mechanized mining, I want to digress

for a moment and talk on safety as the executive's responsibility, because unless we understand that safety is primarily the executive's responsibility, we probably will remain under the impression that safety is everybody's responsibility, and therefore—nobody's.

Please get the distinction between responsibility for a movement and the deriving of benefits therefrom. It is, of course, to the advantage of both labor and industry to prevent accidents, for labor will suffer less if there are fewer accidents, and industry will operate on a lower cost basis. The question as to where one shall place responsibility must be resolved by determining who the individual is without whom the safety movement must collapse and with whose help the safety movement cannot fail. Therefore, the head executive of the employing company must adopt a definite safety operating policy, and secure the active support of all mine officials and employees to insure its success. And the support of the company safety policy must be made a condition of employment.

Whether or not the employees choose to cooperate voluntarily is not of paramount importance. A strong executive can induce the men in his employ to do as he wishes, if his object is a good one, regardless of their private opinion of the work that he is carrying on. The strong executive can so intrench himself by virtue of his authority, and more particularly his logic, that he can completely change the morale of his organization of men. But, on the other hand, no matter how enthusiastic the employees of a plant may be for improvement in safety and accident prevention methods, unless the executive responsible for that plant believes in the safety movement, the safety work at that plant will not prosper.

So, although everyone benefits from safety and accident prevention work, the responsibility for it must rest with the executive, who alone determines by his attitude and conduct, whether the work will fail or succeed.

Safety work is, to a great extent, educational; and where a work is so largely abstract as educational work must be done, we must recognize the fact that the men who are responsible for the movement must be inspired and inspiring leaders. The selection of a safety director is the first, and easily the most important phase of the executive's re-

\* Chief Engineer, Coal Operators Casualty Co.  
† Presented at American Mining Congress Convention, Cincinnati, Ohio, May, 1935.



sponsibility. Too often the safety director is appointed out of a group of employees whose usefulness in other departments has been diminished by a change in working conditions. There is no question that they are doing everything within their power to promote the work to which they have been assigned. But there is lacking in them, the vocational experience and knowledge necessary for success.

The safety directorship of a mine should never be made a shelf for superannuated employees—whether that superannuation results from the pressure of years or from changes in personnel or operation that have left certain individuals unprovided for.

I am convinced that management has the greatest responsibility for accident prevention. I am convinced that just as soon as the highest executive in any mine organization insists on safe methods, right then, or very shortly thereafter, you will see a permanent decline in the number of accidents.

Do not, however, misunderstand me. I do not mean that the president or the general manager should go through the mine or plant and personally look into conditions and issue detailed orders as to how to stop accidents. But after having organized a safety department, they make it plain to the superintendent and all foremen that they expect safety to hold the same place in their thinking as production and cost, and that they will be measured and held just as accountable for safe operation as they are for production, right then you will note your accident frequency and severity rates will start registering in the proper direction. When the management insists on safe operation, we will have it.

It was the first of March, 1930, that I accepted the job of Safety Director at the Wildwood Mine and I must say that I was greatly impressed with the interest that was manifested by the president of the company and his associates, in the safety movement. You could see

that in the operation of the mine for 15 months with no organized safety program, that the officials began to realize that accident prevention work is not a thing apart in itself, but rather an essential and integral part of economical production. I can say that four and one-half years of organized accident prevention work has resulted in increased efficiency, economy in operation, improved relations and a very large decrease in the number of lost time accidents.

In starting a systematized campaign for safety, the first move was the physical examination of prospective employees. In a mine such as ours, we thought it necessary to employ men who were not only intelligent, but also physically fitted for the work they were to perform.

Second in order, was the training of foremen in safety consciousness; however, selecting the right material for foremen was the big end of the problem. For no amount of training can make a first-class man out of second-class material. Probably the first essential of a good foreman is leadership. If we expect the foreman to get production and maintain a low face cost, and to see that all work under his supervision is done safely, then it is necessary that we teach him how to do these things.

The foreman at our mine is a representative of the safety department in the shop and on the section, and acts in the capacity of a safety director over his particular group. The safety of the men working for a foreman usually is in proportion to his ability to interpret the management's sincerity to them correctly, for what the workman thinks of the foreman he also thinks of his company. If the foreman is just or unjust, friendly or unfriendly, interested in safety or indifferent to it, the workman concludes that the company is imbued with the same spirit. The workman is no more interested in safety than he believes his foreman is.

Employees today are keenly interested in having a safe place in which to work, modern machinery and a foreman who is not only friendly but looks out for their interest and gives them a square deal. It has always been our policy to lead our men by practicing fellowship at all times. Our foremen have been instructed to keep in close touch with their men, think with them and work with them, but always ready to give counsel and advice, but be slow to criticize and to see that the men are satisfied, for usually a satisfied workman makes for safety.

Education is often said to be the cure for unsafe practices. To some extent this is true. Safety education is essential and should be developed to a high degree, but the fact that certain unsafe practices will not be tolerated is more easily learned than a knowledge of accident hazards.

In May, 1930, the Bureau of Mines' car visited the mine and gave mine-rescue and first-aid training. Through the medium was laid the foundation of safety training and educational work among the employees. During the four-week period in which these classes were conducted, 97 percent of the men qualified and received Bureau of Mines' certificates. Two weeks was taken in training the key men, all of whom were foremen. It was the duty of the foremen to train the twenty or less men who worked under him. During the course of training, 20 of our men were trained also in the principles of mine rescue and recovery operation after mine fires and explosions.

To maintain enthusiasm in safety work, the Bureau of Mines on request, organized a Chapter of the Holmes Safety Association from among the mine personnel. These meetings are held monthly and programs are arranged which include outside speakers, music, a floor show, which usually lasts an hour, and afterwards the meeting ends by having a dance for all those who

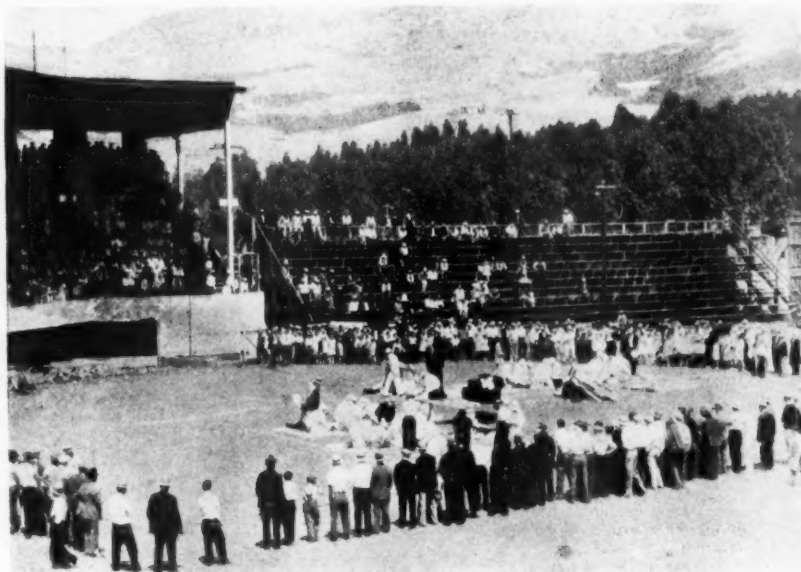
#### COMPARISON OF ACCIDENTS AND COMPENSATION COSTS

	1930	1931	1932	1933	1934
Tons mined .....	764,580	722,490	616,811	532,702	617,746
Total number of accidents reported .....	283	109	80	60	74
Number of non-compensated accidents (lost time) .....	120	25	11	4	6
Number of compensable accidents .....	117	37	12	13	24
Total number of lost-time accidents .....	237	62	23	17	30
Total number of no lost-time accidents .....	46	47	57	43	44
Number of over sixty-day accidents .....	20	9	6	4	5
Number of permanent partial disabilities .....	3	1	0	0	0
Number of permanent total disabilities .....	4	0	0	0	0
Fatalities .....	3	0	1	0	0
Frequency rate .....	329.22	81.55	35.54	26.22	34.18
Severity rate .....	61.16	8.64	10.99	1.72	1.44
Total cost of accidents (medical) .....	4,412.68	2,405.00	1,816.00	1,182.00	1,738.50
Hospitalization cost .....	2,211.65	984.00	697.50	682.75	762.75
Compensation cost .....	54,946.15	8,338.33	9,794.13	2,003.62	2,314.62
Total cost of all accidents .....	61,570.48	11,727.33	12,307.63	3,868.37	4,815.87
Cost per ton .....	.081	.016	.019	.007	.007
Cost per \$100.00 pay roll .....	7.16	2.34	3.01	1.17	.89
Compensable accidents per 1,000 man-days .....	1.30	0.389	0.160	0.160	0.220
Total number of accidents per 1,000 man-days .....	3.144	1.148	0.987	0.741	0.679
Tons produced per lost-time accidents .....	3,226	11,653	26,818	31,335	20,592
Tons produced per compensable accidents .....	6,535	19,527	51,401	40,977	25,739
Tons produced per fatality .....	254,860	.....	616,811	.....	.....

care to participate. Some 500 or 600 employees, with their families, attend regularly these monthly Holmes meetings. In addition to these monthly meetings, each foreman holds a weekly meeting at lunch time on the section with his particular group of men. At these meetings, men are instructed in the proper way to test roof (using the vibration method), how to set mine timbers, how to trim cap pieces, the use of hand tools, how to block cars, the safe handling of explosives, care in the handling of electric cables, machines, etc. All lost time accidents and near accidents that have occurred during the month, their causes, cost, etc., are explained to the men at these meetings, the ways and means of preventing similar accidents are described. At these meetings, we also let our men know that we welcome their suggestions on safety, as well as on those operating problems which we feel improve the conditions under which our men must work. To follow such recommendations as our workmen often make, proves sometimes to be quite costly; however, it is the policy of our company to correct and take care of such recommendations immediately, even though they may be costly, for we find such compliance assists materially in building up the morale of the men. The providing of a clean, well-illuminated and well-timbered manway, clean haulage roads with adequate clearance, sets an example to the men which is worthy of emulation. The design, erection, and maintenance of all construction in accord with safety standards, demonstrate that the company is willing to take its full share in the promotion of safety.

We have an organization also known as the Foreman's Safety Council, which meets on the fourth Friday of each month. This council meets for the purpose of making cooperative study of mining hazards. Accidents and all near accidents which have occurred during the month are studied, recommendations are made by the foremen, and suggested rules are formulated by the council, which cover the operation of machines and other matters relating to safety.

An executive committee, which consists of the electrical and mechanical engineer, the superintendent, mine foreman, outside foreman, the mining engineer and safety engineer, meet on the Tuesday following the Foreman's Safety Council. This committee acts on the recommendations and rules offered at the regular meeting of the Safety Council. In considering the formulation of any rule in safety work, this committee must give consideration to four principal questions before we actually adopt or formulate the rule, and these four questions are as follows: First—can the condition we hope to correct by the rule, be eliminated, or overcome in some other manner? Can we, by changing an operation, a production method or an item of mine, shop or plant layout, eliminate the condition we are aiming at? If not, we must formulate the rule to overcome the condition. But if we can, by some other method, make full correction, then we have simplified our op-



erations and eliminated the necessity of a rule.

Second: Is the rule under consideration enforceable? In other words, is the adoption of the rule going to create a hardship in enforcement which would produce an intolerable condition? If so, we should not consider it.

Third: Will it encroach on, or interfere with some other part of mine management? We all know that if mine management calls for certain procedures, and our rule calls for something different, one or the other is bound to suffer; and it is essential that we find out these facts before adoption, and endeavor to synchronize the two so that they will work smoothly. Careful advance analysis will eliminate points of interference.

Fourth: And all important is the wording. It must be legible and intelligible to all. We have all seen rules where insufficient consideration had been given to the wording, with the result that more than one interpretation could be placed on them. The wording must be simple, effective, to the point, and above all, easy of interpretation.

Everyone appreciates the need for written instructions on safety, but unless these instructions are followed up and enforced in the plant, nothing is accomplished. It is natural for some men to follow the course of least resistance, and as some safety rules require additional steps, they will not be observed, regardless of all written instructions, unless the man can be made to understand that the rules are for his benefit.

The problem of getting the new man started off on the right foot from a safety standpoint is a big one. At our mine, the mine foreman does all the hiring of men for the mine; he, in other words, selects the man and gives him a note to the safety engineer, wherein he states that he wishes to employ Mr. .... as a motorman, for a certain

foreman on a certain section. An employment card is then made out by me, showing where this man was last employed and also previous employers, his age, nationality, whether he is married or single, the number of children under 16, the location of his family and where he intends to reside if given employment. After having filled out the employment card, he is sent to the superintendent with the card and a physical examination form. After the superintendent has interviewed the man, he is then sent to the doctor. After he receives his physical examination and if he be found physically fitted to go to work, he brings his employment card and physical examination report back to me, where it is filed. The new-comer is then given an explanation of the rules pertaining to his duties and made to understand that the most important part of his duty is to avoid getting hurt. He is then given a letter to his foreman, requesting the latter to take a personal interest in him and to show him the safe method of performing his duties.

*Discipline or Punishment:* There was a time, perhaps no more than a decade ago, when the mind of the industrial worker was ruled largely by fear. Among other phases, this real obsession took the fear of punishment and fear of physical suffering. By the acceptance of employment he assumed the risk of whatever misfortune might befall him in the performance of his duties. If his productive ability waned, he was subject to immediate dismissal from industry. But today we find a growing acceptance on the part of management of a two-fold duty. The money invested in a mine and the labor that maintains it must both be conserved equally. Management has realized that a working force properly trained, provided with incentives to seek further education, and relieved of former psychological handicaps, is capable of development into ef-

iciency to a degree previously inconceivable. Partly this has been accomplished by means of compensation for accidental loss of earning capacity, by insurance for dependents in case of death, and by the employment of an efficient disciplinary system.

By definition, discipline means "The setting of an example," or the following of an example that has been set. In other words, discipline is practical instruction and is the most effective method of education. It is a social necessity, and by its proper employment, management has been able to reach a higher state of efficiency.

No longer is a man known for an excessive degree of "hard-boiledness" selected as the foreman of a group of workers. Today one of the fundamental duties of our foremen is instruction of his men in the proper performance of their work. The ability of the foreman to accomplish this through voluntary co-operation is true discipline. The majority men when you know them, are susceptible to leadership. It is, however, regrettable that a small number will not voluntarily respond to leadership; but for the protection of the majority, these few should be subjected to adequate penalties.

Such discipline or penalties as were established in 1930 was applied indiscriminately to our foreman as well as to our workmen. If there is one measure of correction that should be approached carefully, with forethought, it is that of penalizing the foreman and the employees. To be effective, it must be administered justly. In all cases, the penalties employed were only in those cases where employees wilfully neglected logical safety rules and deliberately avoided the safe practice training given them.

All accidents are thoroughly investigated, and these injuries are charged against the foreman in charge. The foreman is held solely responsible, unless the investigation shows that it was beyond his control. If the accident occurred through the lack of discipline or supervision, failure to instruct the workmen properly in the manner in which to perform his work, or through failure to remove a hazard, the foreman is held responsible and is laid off temporarily. I firmly believe that penalties should be inflicted on foreman and workman in the same manner and in the same degree as for other infractions of operating rules, and when safety to life and limb is regarded by both management and the supervisors in the same light as the preservation of equipment, only then can an accident prevention program produce lasting results. Every effort should be exerted to banish the idea that safety is extraneous to other operating duties.

In our efforts as safety engineers to secure better safeguarding, we have heard the worn-out arguments: "We are not making money; We can't afford the cost." Everybody wants employers to make a fair return, but regardless of profit, no one has a right to conduct or operate a mine in such a manner that

the health and safety of the employees are endangered.

It is more than vicious for an employer to claim the right of selecting the best physical specimens among prospective employees while he maintains conditions in his mine which menace the health and safety of those who work therein.

Most of the difficulties between management and employees are due to lack of understanding. There is no finer common ground on which management and men can meet than the continuous conduct of a campaign for the elimination of accidents. Here the workman has a contact with the management, and the management has contact with each employee in the mine. The management must always be absolutely on the square, for there will always be a few suspicious characters among men. The majority, however, appreciate anything that is done for their welfare, particularly the elimination of suffering and loss of time. There is no better means of creating good feeling among employees than to show them that their interests are considered to the point where the company is willing to sacrifice profits and time to prevent their being hurt. While it

to show just what has been accomplished:

1929	
Accidents reported .....	223
Lost Time Accidents .....	129
Compensable Accidents ..	67
Over 60-day Accidents ..	10
Permanent Disabilities ..	2
Fatalities .....	2
The amount of Compensation during the year	
1929 amounted to .....	\$12,860.90
Medical Cost .....	4,820.18
Hospitalization Cost .....	2,114.50
Total amount paid for accidents .....	\$19,615.58
or a cost of .07 cents on each ton of coal mined.	

For every 2,152 tons of coal mined during 1929, there was a disabling injury, and for every 4,145 tons of coal mined, there was an injury for which compensation had to be paid.

Other accomplishments that I feel is worth while mentioning at this time are the accidents from falls of roof.

During the year 1930 there were 10 accidents from falls of roof, which included two fatalities, two permanent total disabilities and six minor accidents. The total cost of these accidents from falls of roof amounted to \$20,055.55, or 2.7 cents per ton of coal mined. In 1931 there were six accidents from such causes, with no fatalities or permanent total disabilities. The total cost amounted to \$2,720.94, or 0.3 cents per ton. In 1932 we had only two accidents from falls of roof with a cost amounting to \$976.00 or 0.1 cent per ton. The date of the last fatality from roof falls was on December 27, 1930, and from that date to January 1, 1935, we have mined approximately 2,504,507 tons of coal without a single fatality from falls of roof. The date of the last disabling injury from falls of roof was September 7, 1932, and from that date to January 1, 1935, we have mined 1,386,206 tons of coal without a roof fall accident.

April of 1932 was the first month in which the Wildwood Mine operated without a single disabling accident since the mine opened in December of 1928, and during 1932 we completed four different months without a disabling injury. In 1933, we operated our mine from February 23 to August 26, a total of 184 days, and mined approximately 247,000 tons of coal without a single disabling injury.

Notably among the accessories selected to increase safety and to aid operation is the A. and G. semi-automatic safety coupler, with which the cars and locomotives are all equipped. As the cars are of steel and the couplers were incorporated in this design, they are of unusually rugged construction. The coupling consists of alloy steel castings with a forged spring that absorbs both pushing and pulling shocks. It has been noted that, with this spring mounting, a motorman can handle with safety, trips larger than could be handled with the conventional mine-car coupler and a given size of locomotive. Observation during approximately five and one-half years of coupling service has shown that

#### Analysis of Lost Time Accidents Nature of Injuries

Nature of Injuries	1931	1932	1933	1934
Contusions .....	9	8	2	7
Abrasions .....	3	2	1	1
Lacerations .....	14	14	1	2
Punctures .....	2	8	3	3
Fractures .....	8	7	5	6
Sprains .....	5	3	1	2
Bruises .....	15	13	1	3
Burns .....	7	10	0	3
Hernia .....	1	0	0	1
Strains .....	2	2	0	0
Dislocations .....	0	0	0	0
Infections .....	0	0	1	1
Shock (electrical) .....	0	0	0	0
Eye injuries .....	15	12	0	1
Amputations .....	1	0	2	0
Abscesses .....	0	0	0	0

is impractical to prove on paper production and profit increases as our accident record becomes better, I know of no single instance where the promotion of safety hasn't helped the efficiency of the company as a whole.

There has been a prevailing opinion among mining men that modern mechanization for loading coal in the mines would materially increase the hazards and result in higher fatality and injury rate. Our experience has been just the opposite. The safety record of the Wildwood Mine, either on a tonnage basis or actual hours of experience to employees, will prove that, with the same organized safety efforts applied, mechanical coal loading can be made safer than hand loading in the thick Freeport coal mining district.

A review of the accident record of the Wildwood Mine over the last six years shows very gratifying results in the prevention of accidents. For sake of comparison, I will give a few figures



with these safety features provided, it is unnecessary for employes to place their bodies between car ends while coupling trips. The pin can be placed by hand and the cars coupled automatically by impact. It is interesting to note, that because these couplers have been used, derailments and coupling breakage have been greatly reduced, and that no hands, fingers or other parts of the body have been injured during the mining of approximately 3½ million tons of coal.

There are things constructive and things destructive in our lives. Knowledge, thoughtfulness, and a due regard for our dependents and fellow-workers always kept in mind and used to the best of our ability, are big factors in bringing us success and happiness.

Ignorance, thoughtlessness, and daredeviltry destroy the worth-while things of life.

In conclusion, I must say that I cannot help feeling that in many cases management has had the idea that safety work involves continual correcting of conditions, replacement of obsolete equipment, re-arrangement of machinery, modern buildings, modern sanitation—things which cannot always be achieved immediately. Consequently, safety has gone by the board.

All those things are desirable and pay dividends, we know, but the impossibility of their immediate attainment should not discourage efforts to improve conditions and to promote safer practices.

The principal duties and functions of management in connection with safety work, as I see them, are:

1. Let the applicant for a job know before he is employed, that you have a safe plant; that you expect him to work safely, to obey safety rules as well as operating rules.

2. Mean what you tell him.

3. See that each employe's foreman instructs him in the hazards,

PERCENT REDUCTION IN ACCIDENTS			
Percent Reduction	1934	As Compared With	1930
73.8 in No. of accidents reported during.....	1934	as compared with	1930
95.0 in No. of non-comp. accidents (lost time).....	1934	as compared with	1930
79.4 in No. of compensable accidents during.....	1934	as compared with	1930
87.3 in No. of lost-time accidents during.....	1934	as compared with	1930
75.0 in No. of over 60-day accidents in.....	1934	as compared with	1930
86.6 in the frequency rate during the year.....	1934	as compared with	1930
97.6 in the severity rate during the year.....	1934	as compared with	1930
60.6 in the total medical cost of accidents.....	1934	as compared with	1930
65.5 in the hospitalization cost during.....	1934	as compared with	1930
95.8 in the compensation cost of accidents.....	1934	as compared with	1930
93.8 in the total cost of all accidents.....	1934	as compared with	1930
91.3 in the cost of accidents per ton mined.....	1934	as compared with	1930
88.9 in the accident cost per \$100 pay roll.....	1934	as compared with	1930
83.0 in compensable accidents per 1,000 man-days.....	1934	as compared with	1930
78.4 in total No. of accidents per 1,000 man-days.....	1934	as compared with	1930
19.2 in tons of coal mined during the year.....	1934	as compared with	1930

if any, in connection with the plant as a whole, and with his own work in particular.

4. Instill in the minds of all foremen the necessity of proper and continuous functioning with regard to safety, just as you do for production.

5. Take good care of your employes when they are injured. They are human, and need to be cared for, and the natural human interest and thought for their welfare brings a prompt award.

6. See that each accident is properly investigated, the cause determined, and the responsibility placed where it belongs. Use the facts from specific accidents to warn employes. Discipline when necessary.

7. Be prompt to correct the small, needless hazards. Take care of the

larger items as rapidly as you can, but while they exist, point them out and protect them the best you can until they can be properly protected.

What can management expect from its investment in safety? The answer is, you get back in proportion to what you put in it. If made wisely, it is an investment; if not, it is a speculation, and you may or may not get a profit. If the investment is wisely made and followed up the results should be:

1. A cleaner, more orderly, and systematic plant.

2. Fewer accidents with a corresponding reduction in lost-time and compensation.

3. A more efficient, satisfied and loyal personnel.

4. Lower labor turnover.



5. Better quality of work.

6. Lower costs.

7. The knowledge that you have contributed a sizeable chunk of human interest, a share of the happiness of this world, that you have done and are doing your bit.

Organized, systematic and whole-hearted cooperation for the prevention of accidents is a valuable asset wherever it exists and it is one of the important factors which makes successful a coal mining company.

(Continued on page 52)

# MINING METHODS

## In Arizona Copper Mines

By J. P. HODGSON\*, G. B. LYMAN†

W. CRAWFORD‡

**Phelps Dodge Corporation**  
United Verde Branch  
Jerome, Arizona

**Magma Copper Company**  
Superior, Arizona

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Jerome, Arizona

EDITOR'S NOTE: This is Part 1, of a 3-part article upon Arizona Mining Methods. Part 2 will appear in the July issue and Part 3 in August.

**M**INING methods in Arizona copper mines vary widely, owing to extreme dissimilarity between ore deposits and in conditions controlling mining operations. They may be classified roughly into selective methods, such as those used at the Copper Queen, Magma, United Verde and United Verde Extension, and non-selective methods as at Ajo, Inspiration, Miami and Ray.

Determining factors of the general method applied are the geological occurrence, physical characteristics and metal content of the deposits. The ore bodies of the first group are vein and replacement deposits, the greater part of the ore being primary sulphides of comparatively high grade. The deposits of the second group consist largely of disseminated sulphides (principally chalcocite in schists and acidic porphyries).

High taxes and labor costs, low metal prices, increasing depths of operations, and in some cases diminishing tonnage and grade of ore have resulted in mechanizing operations to a high degree, but, notwithstanding such investments, all of the important copper mines in the State have either operated on greatly reduced schedules or have ceased production entirely during the past four years.

Acknowledgement is made for data supplied by the officials of the different companies and to the United States Bureau of Mines, the American Mining Congress and the American Institute of Mining and Metallurgical Engineers, from whose publications much of the information contained in this paper has been obtained.

In order to present all of the important mining methods, it is necessary to describe the operations at each mine, but as space limitations require such descriptions to be brief, the reader is referred to the bibliography for detailed articles on the mines considered.

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## PHELPS DODGE CORP.

### United Verde Branch

#### ORE OCCURRENCE

**T**HE orebody at the United Verde mine consists of irregular shaped lenses of sulphide ore lying, in general, between a hanging wall of non-copper bearing massive sulphide and a quartz porphyry footwall. The lenses extend into the massive sulphide and also replace, in part a black schist of irregular thickness that lies on the massive sulphide-porphyry contact. Variable conditions preclude the adoption of any single mining method, but about 60 percent of the total tonnage is mined by the flat cut and fill method.

#### DEVELOPMENT WORK

Annual development work averages about 25,000 ft. Tonnage blocked out is approximately 70 tons per ft.

In opening new levels, after shafts have been deepened and connected, a crosscut is driven to a point near one end of the orebody. A drift in the iron-schist contact is then driven the full length of the orebody and is connected back to the cross-cut at the most convenient point. Diamond drill holes from the contact drift determine the ore outlines which, for the preliminary work, have been approximately determined by projection from upper levels and occasional diamond drill holes.

#### STOPING METHODS

In laying out the stopes, vertical pillars are left, their location depending largely upon those on the levels above. In order to leave as little ore as possible, these pillars are as small as is consistent with good mining. They are later mined, starting on the upper levels and working downward.

Auxiliary crosscuts are driven through the orebody at approximately 40-ft. intervals to obtain proper chute spacing. Stopes are silled at a point 24 ft. above the level, the sill cut being carried to the pillar limits. The necessary raises for access, ventilation and admission of waste fill, are provided for each stope.

Waste fill is obtained from development work and from raise systems to the surface. Part of the fill is also provided by the steam shovel pit.

Main crosscuts and the auxiliary drifts are 6x8 ft. in section. Drift crews in main crosscuts consist of two miners on one shift and two muckers on the other. In auxiliary crosscuts, one miner and two muckers are employed. All mucking has been done by hand, but underground power shovels are planned for some phases of future development work.

Except in special cases, raises are driven 6x11 ft. and timber cribbed. Raise crews consist of two miners who do all

the drilling and timbering on one shift. Chutes are pulled on the opposite shift. Advance per miner shift varies from 1½ ft. in soft black schist to as low as 0.2 ft. in hard massive sulphide intermixed with jasper.

The stoping method used depends upon the physical character of the ore and the location of the stope. If after silling there is no indication of undue weight and the stope is in the main orebody requiring vertical pillars, it is mined by the flat cut and fill method. In cases of isolated orebodies in the massive sulphide hanging wall, which are of a size not requiring pillars, the shrinkage method is sometimes used. In schist stopes with heavy ground, and for the removal of both vertical and horizontal pillars, the flat square set method is used. Inclined square set methods have also been used successfully for the removal of pillars. Top slice methods have been used in special cases.

#### HORIZONTAL CUT AND FILL STOPING

This method is applicable to orebodies of different sizes and also is employed in the main orebody by leaving vertical pillars for support between two or more stopes. The advantages of this method include practically 100 percent extraction, clean mining, convenience for hand sorting, low timber cost, high daily tonnage per square foot of area, low development cost, ease of ventilation and low fire hazard, and its facilitates wall prospecting. Working conditions are excellent and with proper supervision a high degree of safety is obtainable. Plate 1 illustrates a typical stope of this type.

Flat cut and fill stopes vary in width (between hanging wall and footwall) from 10 to 160 ft., and up to 200 ft. in length. The maximum area is held to 12,000 sq. ft. by leaving vertical pillars extending from hanging wall to footwall. The width of pillars has been standardized at 35 ft.

Chutes are spaced at 16½-ft. centers in sulphide stopes and 22-ft. centers in schist and porphyry stopes. Manways are spaced at approximately 50 ft. intervals in long, narrow stopes.

Stoping starts with a flat cut 7 to 9 ft. high at an elevation of 24 ft. above the track, leaving a horizontal pillar to protect the level gangways, which in such cases seldom require timber. Sills and planks are laid on the stope floor and a second cut, 7 ft. high, is stoped. Drilling is done by one miner who is followed closely by the muckers. Ore chutes are then raised and waste filling starts. Waste is run in from the fill raise forming a cone upon which is built a waste pocket. From this pocket the waste is spread by trammers using 18 cubic-ft. scoop nose cars. Fences are erected along pillar walls, and floors laid from fence to pillar on each stope floor, in order that when the pillar is mined only one floor of such broken ore will run at one time.

In blasting long holes, the number of large boulders is reduced by sectional

loading of holes, placing two sticks of tamping between each stick of powder. Powder is connected by Cordeau-Bickford fuse. Each round drilled is sampled daily so shift bosses are kept in close touch with metal values.

Nearly all mucking is done by hand, the crew consisting of six muckers and one machine pluggerman on each shift. All ore is broken to pass an 11-in. grizzly opening.

The waste filling is floored over after each cut, the flooring being salvaged before successive fillings. The back is supported by bulkheads when required.

In stopes having two or more waste raises, continuous production is maintained by starting a new cut from one raise, while filling of the previous cut is being carried on from the other.

As a rule, when the back of the stope is within two floors of the level above, it is completed by square sets carried up to the sills of the stope above the upper level, or a total of five floors. Thus, approximately 25 percent of the total volume of the stope is mined by square sets.

Miners drill from 6 to 8 six-ft. holes in hard sulphide, and about 12 nine-ft. holes per shift in schist. Muckers average about 20 tons per shift. Waste spreaders average 70 cars per shift. Timber crews consisting of two men do the new timbering in the stope. All stope operations are paid for on bonus or contract.

During 1929, direct costs and efficiencies were as follows:

Labor cost .....	\$0.85 per ton
Explosives .....	0.6 lbs. (50%) per ton
Timber .....	6.95 bd. ft. per ton
Tons per man shift in Stope .....	8

#### INCLINE CUT AND FILL STOPING

Although seldom used, this method has been successful where applied.

The chief disadvantages of the method, as compared to the flat cut and fill, are the inability to sort waste and the difficulty in placing bulkheads for safety.

Development work is much cheaper than for flat cut and fill, as chute raises are needed only at the bottom of the incline, and one waste raise at the weakest side of the footwall is invariably sufficient.

The sill floor is carried flat, as in the flat cut and fill method. The back is then inclined to an angle of 40 degrees with the floor by mining 10-ft. slices from the waste raise. At the bottom, the back is raised flat to a height of 19 ft. above the grizzlies to form a blasting chamber, which is timbered with a row of square sets. Incline cuts are thereafter started at the bottom and carried upward.

After the cut has passed the waste raise on one side of the stope, the ore is drawn off and the floor cleaned down and salvaged. The chutes and blasting



chamber are raised 14 ft. above the grizzlies and the stope is filled to the top of the square sets. When the fill reaches the top of the square sets, it is floored over and mining starts again. In wide stopes, mining can be made practically continuous.

Costs and efficiency on this type of stoping, during 1928, are shown below:

Stope labor cost per ton.....	\$0.71
Tons per man shift (stope labor) ..	9.0
Pounds explosive per ton.....	0.55
Board ft. timber per ton.....	5.9

#### OVERHAND SQUARE SET STOPING AND FILL

This method is used chiefly for the extraction of pillars left in horizontal cut and fill stoping and occasionally in the vicinity of old workings and fire stopes. Pillars may be either vertical or horizontal and are usually quite heavy, necessitating great care in order to mine them safely.

The area to be stoped is divided into small sections that can be mined and filled rapidly. In mining horizontal pillars, chutes from the cut and fill stopes below are carried up through the pillars. Timbers rest on sills laid on top of a mat of old flooring, which permits the sets to take weight evenly.

Vertical pillars may be divided vertically, and square set gangways run on the first and eleventh floors. Sills are then laid on the second and twelfth floors.

Cost and efficiencies are as follows:

Direct stope labor, cost per ton....	\$ 1.44
Tons per man shift .....	4.7
Pounds explosive per ton .....	0.6
Board ft. timber per ton.....	12.52

#### INCLINE SQUARE SET STOPING

This method has been used for the extraction of horizontal cut and fill pillars. It is applicable to heavy ground requiring close timbering. Practically no hand mucking is required. The greatest disadvantage is the difficulty of hand sorting.

Briefly, the method consists in mining a flat square set section across the center of the pillar from footwall to hanging wall. Upon completion of the section to the top of the pillar, two stopes are started, one on each side of the pillar and retreating from it. The backs of these stopes are carried on an incline, each floor extending out one set beyond the next higher floor. Waste filling follows closely behind mining operations.

Costs and efficiency of the method are as follows:

Direct stope labor, cost per ton....	\$ 0.46
Tons per man shift (stope labor) ..	5.0
Pounds powder per ton .....	0.6
Board ft. timber per ton.....	11.0

#### SHRINKAGE STOPING

As ore areas in general are not applicable to this method, it is used only in isolated cases where conditions are suitable. Application at the United Verde does not differ greatly from the conventional method, so a description is omitted. Attention is called to ref-

erences which will be listed at the end of the third installment of this article.

#### DRILLING

Accurate records are kept of all machine drill repair costs which average from \$0.41 for jackhammers to \$0.92 per drill shift for drifters. All repairs are made in the drill shop. Line oilers are used with practically all machines.

Two types of drill steel are in use,  $\frac{3}{8}$ -in. quarter octagon for jackhammers and light stopers and  $1\frac{1}{4}$  in. hollow round for heavier machines. Double taper cross bits, with 5 degree and 14 degree taper, are used throughout. Starters are 30 inches long with  $1\frac{1}{8}$ -in. gauge. Changes are in multiples of 10 in., with 1-16 in. gauge changes. Steel in circulation amounts to 36,000 pieces.

Drill bits are forged at 1900 degrees F. In tempering, they are quenched at 1400 degrees F., ranging in hardness from 500 to 600 in Brinell scale. Shanks are forged at 2100 degrees F., and hand

levels, however, still have trolley haulage.

Tracks are laid on 18-in. gauge, with 50-lb. rails, and have a grade of from 0.25 to 0.50 percent in favor of the load. Ore cars are 24 cubic ft, rocker bottom type and are equipped with roller bearings.

Ore trains consist of sixteen 24 cu. ft. cars or a trailing load of 43 tons. Waste trains are made up of 12 cars.

#### MAIN HAULAGE

All ore, including that from the open pit, is handled through the Hopewell Tunnel, 7,200 ft. long, to the Hopewell ore bins. This tunnel is on the 1,000-ft. level, to which all ore from the mine is hoisted.

Tracks are laid on standard gauge with 75-lb. rails, and have a grade of 0.25 to 0.50 percent in favor of the load. Rolling stock consists of 25-ton electric locomotives and 40-ton bottom dump cars. Nine cars constitute a train.

From the Hopewell ore bins, the ore is taken to the smelter by standard gauge steam railroad.

#### SHAFTS

Main operating shafts are No. 5 shaft, used exclusively for handling ore, and No. 6 shaft, used entirely for service.

No. 5 shaft extends from the 800-ft. level to the 3,000-ft. level. It is of reinforced concrete with two 5 by 5 ft. hoisting compartments and one 5 by 5-ft. pipe and manway compartment.

No. 6 shaft extends from the 400-ft level to the 3,000-ft. level. Above the 1,950-ft. level, it is concreted solid and is lined below that point with  $2\frac{1}{2}$ -ft. concrete rings at 6-ft. centers.

#### HOISTS

No. 5 hoist is an Allis-Chalmers, double drum, single reduction geared type, driven by 650 hp. d.c. motor at 500 volts and a normal speed of 300 r.p.m. Ten-ft. diameter cylindrical drums will hold 2,500 ft. of  $1\frac{1}{8}$ -in. extra plow steel, 6x19 hoisting rope in two layers.

Skips operate in balance and are of 112 cu. ft. capacity, holding 6.5 to 7.8 tons of ore. The rope speed is 900 ft. per minute.

Ore is hoisted to the 800-ft level and dumped into raises which lead to 1,000-ton capacity bins on the 1,000-ft., or Hopewell Tunnel, level.

No. 6 hoist, manufactured by Nordberg, has a single drum 12 ft. in diameter, with a 6-ft. spiral grooved face. The counterweight reel for  $\frac{1}{2}$  by  $5\frac{1}{2}$ -in. flat rope is rigidly coupled to the drum.

The cage is of double deck, the decks

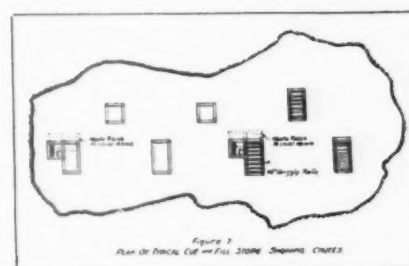
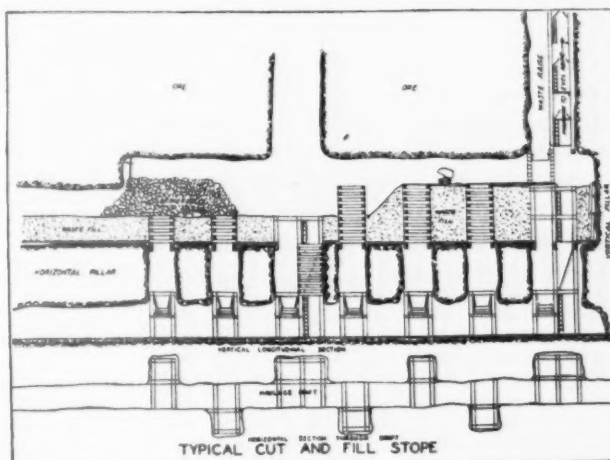


Plate 1

tempered at 1600 degrees F. in quenching oil. Hardness of shanks is from 375 to 400 Brinell.

Shop capacity is 2,500 pieces of steel per 8-hour shift, 1,800 to 2,000 pieces being handled daily. Steel breakage is 2 percent on  $1\frac{1}{4}$ -in. hollow round, and 8 per cent on  $\frac{3}{8}$ -in. quarter octagon. Sharpening costs average \$0.13 per bit, or \$0.06 per ton of ore mined.

#### UNDERGROUND HAULAGE

Ore gathering and waste distribution is done mostly with 5 ton storage battery locomotives. Five of the older

measuring 6 ft. 9 in. by 12 ft. 7 in. and accommodating 50 men each, or four service trucks.

#### AIR COMPRESSORS

Compressed air at 100 lbs. pressure is supplied by three air compressors; one 6,800 cu. ft. capacity with 1,200 hp. motor, one 1,500 cu. ft. with 300 hp. motor, and one 3,000 cu. ft. compressor with 600 hp. motor. All compressors are directly connected.

#### VENTILATION

For ventilation purposes, the mine is divided into two sections. Air for the upper section—from the 700-ft. level to the surface—is drawn through a tunnel on the 500-ft. level and exhausts to the surface through stope raises. Ventilation equipment consists of a No. 9½ American Blower, double inlet, non-reversible, backward curved blade fan, directly connected to a 100 hp. motor. The fan has a capacity of 75,000 cu. ft. per minute at a pressure of 3½ in. of water.

For the section below the 700-ft. level, a double inlet, reversible type, forward curved blade, Jeffrey fan, on the 1,000-ft. level, draws air into the mine through No. 3 shaft and a 982-ft. air raise. Both intakes have been stripped of combustible material and have a combined effective area of 249 sq. ft.

The fan is directly connected to a 440 hp. motor. It is also equipped with an auxiliary 350 hp. belt-connected motor that can be cut in quickly by means of a clutch on the drive shaft. Each motor has three speeds by means of which the amount of air delivered can be varied to offset seasonal changes in temperature and to meet mine requirements in clearing out gases at different times during the day. With the belt-drive motor, the volume of air delivered can be varied from 187,000 cu. ft. per minute on low speed to 222,000 cu. ft. per minute on high speed; and with the direct drive motor from 182,000 cu. ft. per minute to 297,000 cu. ft. per minute, at a pressure of 3.6 in. of water. Dual electric feed is provided; one line down No. 6 shaft and another through a churn drill hole.

With the exception of intake airways, all raises and shafts are upcast. By this means, men on the lower levels are protected from gases generated during blasting, which starts on the upper levels and progresses downward. Return airway consists of raises and an old shaft to surface, and has an effective area of 120 sq. ft.

Auxiliary ventilation is accomplished by small fans and an air injector type of blower. Flexible tubing and galvanized iron pipe are used for this purpose.

#### OPEN PIT MINING

Surface mining was originally started to extract ore from a portion of the upper levels of the mine, in which a serious mine fire exists.

After stripping and removal of the upper portion of the ore by steam shovels and standard gauge railway

equipment, plans called for extraction of the remainder of the ore by means of glory holes, connected by ore passes to the 1,000-ft. haulage level. It soon became apparent, however, that such a method was not practical, as the mine fire made it impossible to drive raises from which to start glory holes at certain desired locations, and also the loose slopes and smoke and gas made working conditions extremely hazardous.

To overcome these difficulties, transfer raises were driven to the pit from lower levels at locations free from fire. Small 1¼ yd. shovels were then installed and the ore transported to transfer raises by automobile trucks equipped with side dump bodies, holding from 7 to 10.5 tons of ore.

Wherever possible, drilling is done by churn drills; the depth, spacing and location of holes depending on ore conditions. Air drills are used chiefly in breaking ground along contacts, in bank trimming and in inaccessible places. Churn drill holes are 6 in. in diameter, close to the edge of the bank and are drilled about 5 ft. deeper than the height of the bank. In hot ground, holes are spaced 4 to 5 ft. apart to reduce the powder charge required.

In drilling hot ground, in which temperature as high as 780 degrees F., have been encountered, it is necessary to devise special blasting methods. Holes in which the temperature does not exceed 120 degrees F., or which can be cooled to that point for a sufficient length of time by means of water or sand, are loaded and tamped in the usual manner.

Holes which cannot be cooled are loaded by enclosing the powder charge in paper or cardboard cylinders which protect the explosive from the heat during the short time the charge is in the hot ground. In small machine holes, cardboard tubes about 1¼ in. outside diameter and 1 in. inside diameter are used. In larger holes, a paper tube of 4-in. diameter and ½-in. walls is used. This method of blasting is not very efficient as a sufficient amount of explosive cannot be used, holes cannot be chambered, nor can the charge be tamped.

Fire conditions have been improved by distribution of mill slimes on the surface and by pumping slimes into the fire area through churn drill holes. The amount of burning ore on lower levels is also less than that encountered higher up, so that as the work progresses downward, general conditions should improve.

Material from the pit is segregated according to copper content and metallurgical requirements into smelting ore, converter ore, milling ore and leach heap ore. Barren material goes to a waste raise and is drawn off as needed for filling mine stopes.

#### SAFETY AND ACCIDENT PREVENTION

All employees are required to have specified protective clothing. Working methods are standardized with safety in view, and the responsibility for instruc-

tion and proper conduct of the work rests with the Supervisory Force.

Throughout all parts of the plant, mechanical safeguards are provided, and the supervisors are responsible for proper maintenance of such safeguards.

The safety department makes periodic inspections and recommendations, supervises transportation of men and arranges blasting schedules. It also issues safety rules and instructions, tests and supplies approved equipment, passes upon safety suggestions, and is held responsible for proper ventilation and mine fire prevention.

As part of the educational safety work, talks are given in the mine, and general and departmental meetings are held.

### MAGMA COPPER CO.

*Superior, Ariz.*

#### ORE OCCURRENCE

ORE deposits of the Magma mine occur principally as closely related lenses of ore in a fissure vein. The dip of the vein is from 45 degrees to 80 degrees, to a depth of about 900 ft., from which point it continues downward at a constant dip of 80 degrees. Vein filling consists of altered mineralized country rock. Post mineral movement has produced both a weak hanging and footwall.

Most of the ore produced has come from orebodies within the fissure from just below the 400-ft. level to the lowest levels. The principal ore shoot on the lower levels is from 1,200 to 1,500 ft. long, and from 20 to 30 ft. wide, and averages from 6 to 8 percent copper. Sulphide ore, containing chalcopyrite and bornite as principal copper minerals, make up the present production. Precious metal content has been 50 to 75 cents in gold and about one-half ounce of silver to each 1 percent copper.

The mine has been developed by five vertical shafts, of which three are now operating. No. 2 and No. 3 shafts go to the 3,200-ft. level, and No. 5 to the 3,325-ft. level. All shafts are rectangular in section and have from 2 to 4 compartments. A large proportion of the shafts are concreted.

Above the 2,000 foot level, the mine was developed by levels at 100-ft. vertical intervals. Below the 2,000-ft. level, the main haulage levels are driven at vertical intervals of 300, 250 and 200 ft., the latter figure being the interval now considered as standard. Intermediate levels are driven midway between haulage levels.

In the general plan of level development, main haulage drifts (8 ft. by 8 ft. in untimbered sections) are driven in the footwall, parallel to and at least 25 ft. from the vein. Intermediate level drifts are 7 ft. by 7 ft. in section when untimbered, and are driven in the hanging wall, parallel to and 13 ft. from the vein. These drifts are used for the transportation of waste filling and for access to stopes. In present practice,

two compartment, timbered, cribbed raises are standard. A typical haulage level is shown on Plate 2.

#### STOPING METHODS

In general, two mining methods are used:

1. Timbered rill stopes where the vein is less than 15 ft. wide.
2. Combination rill and pillar system where the vein is over 15 ft. wide.

**Timbered Rill Stope**—From a footwall drift outside of and parallel to the vein, crosscuts are driven through the vein at intervals of approximately 150 ft. The extraction drift is then driven in ore along the footwall from these crosscuts. Stopes are silled out on the level for a distance of 30 to 40 ft. along the extraction drift and across the vein from footwall to hanging wall. The floor is timbered with standard square sets, except the extraction drift in which the posts are battered.

Square set stoping continues above the sill, the sets being stepped from each end of the section so that the back of the stope is on an incline from the top of the sill sets on each end of the section to a height of 4 to 5 sets at the center. Sill floor posts are 8 ft. 3 in. long, posts above the sill 6 ft., caps 5 ft. overall, and collar braces (8 in. by 10 in.) 4 ft. 2 in. in the clear.

A 2 compartment cribbed raise is now started from the top of the stope to the level above. This raise is driven in the hanging wall against the vein, and after completion is used to dump waste fill into the stope and for lowering timber and supplies. Waste rock from the raise, while it is being driven, is also used for fill. At each end of the stope section, two adjoining square sets are lined with 2 in. plank and serve as ore chute and manway. As stoping progresses upward, these sets are occasionally offset to keep them next to the

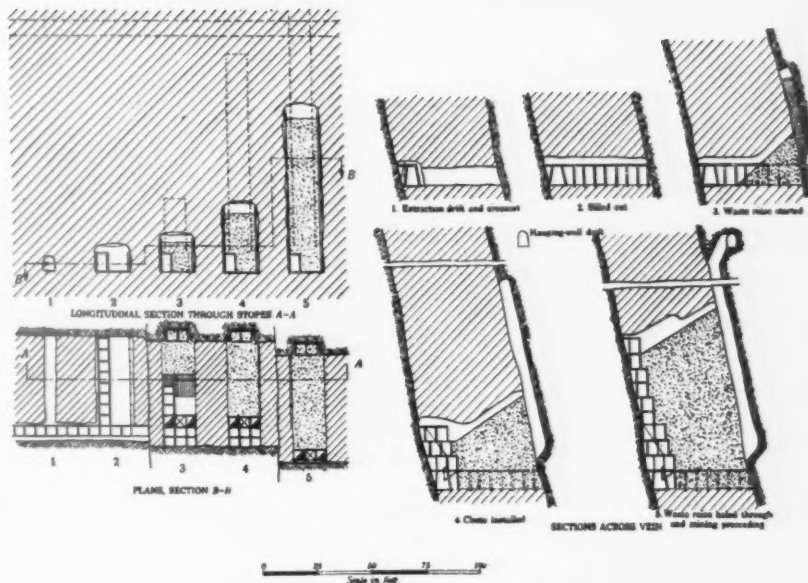


Plate 3

footwall. Grizzlies spaced 9 in. apart are carried on top of the chutes.

The stope is now filled with waste, filling being stopped before the tops of the square sets are covered. After filling, a floor of 2 in. plank is laid on top of the fill.

A 7-ft. cut is now started over the extraction chutes, working upward from the bottom of the stope toward the center. Broken ore slides down the floor to the chutes, requiring some breaking of boulders on the grizzlies, but very little shoveling. During the operation, square sets are stood as soon as room is made. Usually three such cuts are made and the stope again filled.

On completion of the initial stope, succeeding stopes, 15 ft. to 25 ft. long, are started on each end of the filled section.

The sill floors are mined out as before, but above the sill the back of the stope inclines downward away from the filled section, the ore sliding to the extraction chute at the lower end of the stope. Waste fill enters the stope through the extraction raise of the preceding section.

This method is sometimes modified where the ground stands well; and stopes are mined for a distance as great as 90 ft. along the vein, requiring but one waste raise.

**Rill Stope and Pillar System**—This method, as illustrated on Plate 3, consists of a series of 16-ft. rill stopes alternating with 14-ft. pillar stopes.

From the extraction drift, driven in the ore along the footwall of the vein as in the previous method, crosscuts at 30-ft. centers are driven across the vein. These crosscuts are then blasted out to a width of 8 ft. on each side of the center line and to a height of 10 to 12 ft., forming the sill floor of the rill stope. The length of the stope is the width of the vein at that point.

Sills consisting of 10-in. by 10-in. by 16-ft. stringers are laid on the floor of the stope parallel to the vein, and spaced 5 ft. center to center across the vein. A double 2-in. floor is laid upon the stringers. A row of square sets is now stood along one side of the stope, extending across the vein from the extraction drift to the hanging wall. On the other side of the stope, a row of single 8-ft., 10-in. by 10-in. posts is stood across the vein, parallel to the square sets, to serve as a gob fence. When the stope is filled, the square sets are held open as a means of access to future stoping from lower levels and to the hanging wall drift. Independent bridge posts, to which gob lagging is nailed, are stood outside of all sill floor posts that must support

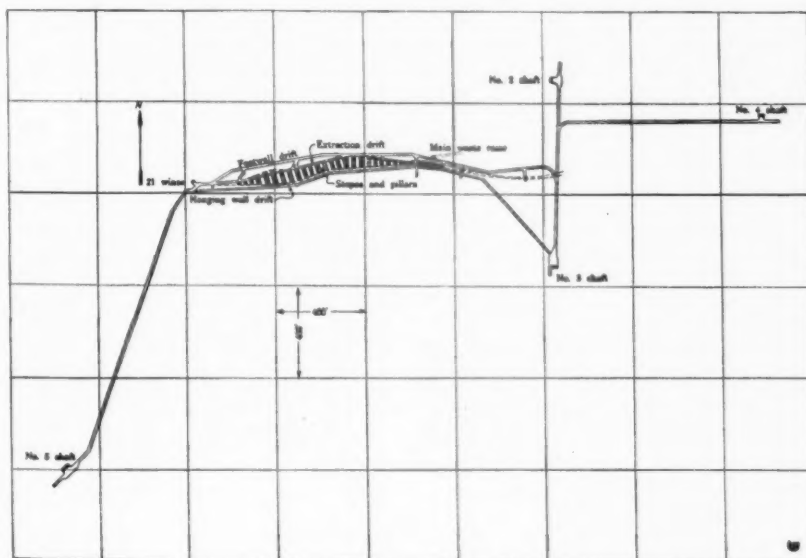


Plate 2



waste fill. Space between the bridge posts and the regular mining posts is 4 in. Against the footwall end of the stope, three square sets are carried up from the extraction drift, the center set to be used as a manway and the two outside sets as ore chutes.

When all sill floor timber is in place, a cribbed raise is started in the hanging wall of the vein at a point about 12 ft. above the bottom of the sill floor. Waste from this raise is run into the stope until, on its natural slope, the top of the fill is within about 4 ft. of the back of the stope. A floor is now laid on the waste and a 7-ft. cut of ore is mined, the back of the stope being inclined upward toward the hanging wall and roughly parallel to the slope of the waste fill. Ore is loaded into cars with mechanical shovels until the stope is high enough for it to run by gravity to the extraction chutes.

After cleaning out the broken ore, gob fences, consisting of single posts end to end lined with 2-in. planks, are extended upward on each side of the rill stope. Old cable is used to tie together corresponding posts on opposite sides of the stope, the cable passing around the joints of the posts. The waste raise is driven only as stope fill is required. As it approaches the level, it is inclined into the hanging to connect with the near side of the hanging wall drift.

When the stope approaches the level, square setting is used to extract the ore directly beneath the old filled stopes above.

In a modification of this method, used in harder ore with stronger walls, the stope is square set to a height of about 50 ft. above the sill on the hanging wall side, from which point the waste raise is driven to the level above, furnishing just enough waste to fill the stope. From this point, rill stoping is continued as previously described. Such stopes are carried up in a single lift between haulage levels, 200 to 250 ft., instead of finishing at the intermediate level as in the first case. Modified rill stoping is shown on Plate 4.

Pillar removal is accomplished by a modified form of Mitchell top slice. Stoping starts at the top of the pillar, and a line of segment sets is placed immediately below the sill floor of the finished stope above. If required, the next floor below is timbered with inverted segment sets. Pillars are mined at a slope of 40 degrees toward the footwall, broken ore running by gravity to the square set extraction chutes of the adjoining rill stope. As stoping progresses downward, 10-in. by 10-in. stringers are placed across the stope between the gob fences of the rill stopes on either side. Stringer spacing is 7 ft. vertically and 5 ft. horizontally. Horizontal segment sets are carried against both hanging wall and footwall on each floor.

As a precautionary measure segment sets are again placed about 50 ft. below the back of the stope, so that if weight

develops, the stope can be floored over and filled at this point.

About 75 percent of the timber is recovered during filling.

Waste for filling is obtained from waste raises in the hanging wall, from development work, and from a surface glory hole connected by a main waste raise to the mine levels.

is  $\frac{1}{2}$  percent toward No. 3 shaft where the main mine pump is located.

#### HOISTING

No. 2 shaft is equipped with a Bollen pulley hoist, and is used for handling men and supplies and waste. The skip capacity is four tons of ore.

No. 3 shaft has a Nordberg double

Type of Stope:	Direct Cost Per Ton				
	Stope Labor	Waste Fill	Explosives	Timber and Supplies	Total
Timbered Rill Stopes .....	\$1.12	\$0.13	\$0.06	\$0.48	\$1.79
Rill Stopes .....	.90	.03	.08	.34	1.35
Pillar Stopes .....	.91	.23	.04	.28	1.46

Comparative costs on different types of stopes are shown below:

Mechanical loading has replaced hand mucking by the use of Butler shovel loaders in stope sills and main haulage drifts, and Finlay loaders in smaller drifts. Drag line scrapers have also been used.

**Drilling**—Heavy jackhammers are used for shaft work and a lighter type for plugging boulders. Leyner type drifters are used in drifts and crosscuts, and hand-rotated stopers in stopes and raises.

Three kinds of drill steel are used,  $\frac{7}{8}$ -in. hexagon for jackhammers, 1- $\frac{1}{4}$ -in. round for drifters, and 1-in. quarter octagon for stopers. Jackhammer and drifter steel are made up in 18-in. changes, and stoper steel in 13-in. changes. Single 14-degree taper cross-bits are used, starting with a 2-3/16-in. diameter, decreasing by  $\frac{1}{8}$ -in. gauge changes.

#### HAULAGE

Trolley locomotives and 40-cu.-ft. gable bottom cars are used in hauling ore to shafts. The average train is 10 cars, and the average length of haul 1,000 ft. Three ton storage battery locomotives and 18-cu.-ft., side dump cars are used for hauling waste fill to stopes. On the 500-ft. level, ore is transported a distance of about 4,000 ft. to the concentrator by a 4-ton trolley locomotive and 3.6-ton cars. Direct smelting ore and limestone for the smelter, timber, and mine supplies are also handled on this level by a 4- $\frac{1}{2}$ -ton storage battery locomotive. Tracks are all of 18-in. gauge laid with 30-lb. rails. Mine track grade

drum hoist with single reduction gearing to a 400-hp., 250-volt, direct current motor. The hoisting speed with the motor at 500-r.p.m. is 1,000 ft. per minute. Skips hold 3 tons of ore.

At No. 5 shaft is an Allis-Chalmers double drum, single reduction, geared hoist, driven by a 500-hp., 2,200-volt, a.c. motor. The hoisting speed is 1,000 ft. per minute, and the depth limit 5,000 ft. Skips hold 3 tons of ore.

#### COMPRESSED AIR

Air compressors are at the smelter power house. There is one 3,600-cu.-ft. compressor, directly connected to a 650-hp. synchronous motor, and one directly connected 1,100-cu.-ft. compressor. Air pressure at the compressor is 100 lbs. and at the mine 75 lbs. per sq. in.

#### VENTILATION

Owing to high underground temperature, ventilation is a very important phase of mining operations. Virgin rock temperatures in the active mining zone range from 109 degrees F. to 115 degrees

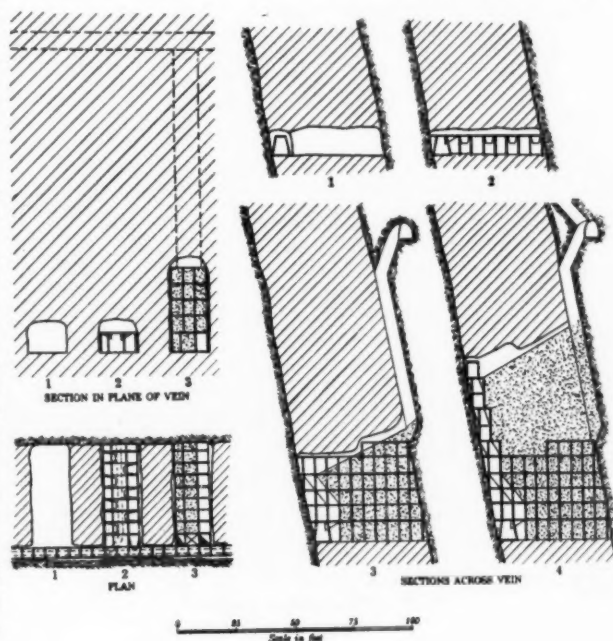


Plate 4

F. Stope temperatures vary from 88 degrees F. in winter, to 90 degrees F. in summer, with wet bulb temperatures about two degrees lower.

Primary ventilation equipment consists of four large forward curved blade, multivane, centrifugal fans, one exhausting on the surface, and three underground. Auxiliary ventilation is necessary in practically all working places away from the major air currents. This is accomplished by small high speed, multivane, centrifugal fans, and 12 and 16-in. canvas tubing.

Fire prevention work is given particular attention in the form of equipment, inspections, alarm systems and pertinent rules.

#### SAFETY WORK

Workmen's committees make regular inspections of all working places in company with the foremen and safety engineer, and submit recommendations to the Mine Superintendent.

Underground safety meetings are held on each level of the mine once a month. These meetings are conducted by the safety engineer, who talks on various phases of safety and receives suggestions from the workmen. A bosses' safety meeting is held once a month.

### UNITED VERDE EXTENSION MINING CO.

Jerome, Ariz.

#### ORE OCCURRENCE

THE orebodies of the United Verde Extension mine consist largely of massive sulphide ores, lying in the hanging wall of the Verde Fault. The principal producing levels of the main orebody are the 1,300, 1,400, 1,500 and 1,600-ft. levels. Smaller outlying orebodies extend from the 550 to the 1,700-ft. levels. Enclosing formations are diorite, quartz porphyry and greenstone.

Mine operations are carried on through two vertical 3 compartment shafts and a haulage adit connecting the shafts on the 1,300-ft. level. The adit is about 2-1/4 miles long and approximately 10 ft. by 10 ft. in cross section. Ore from below the 1,300-ft. level is hoisted to a point above the 1,100-ft. level and dumped into ore passes leading to ore pockets on the haulage adit.

Levels are located at 550, 800, 950 and 1,100-ft. mine elevations, and at 100-ft. vertical intervals, from the 1,100 to the 1,900-ft. elevations.

#### STOPING METHODS

The square set method, modified to meet local conditions, has been used exclusively in mining the main ore lens. By using this method, movement of blocks of sulphide ore with consequent generation of heat has been prevented. Stopes are kept tightly filled with waste,

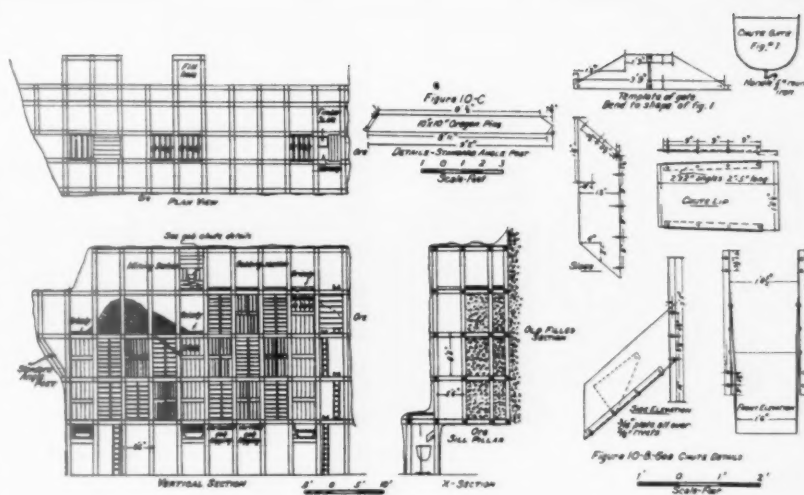


Plate 5

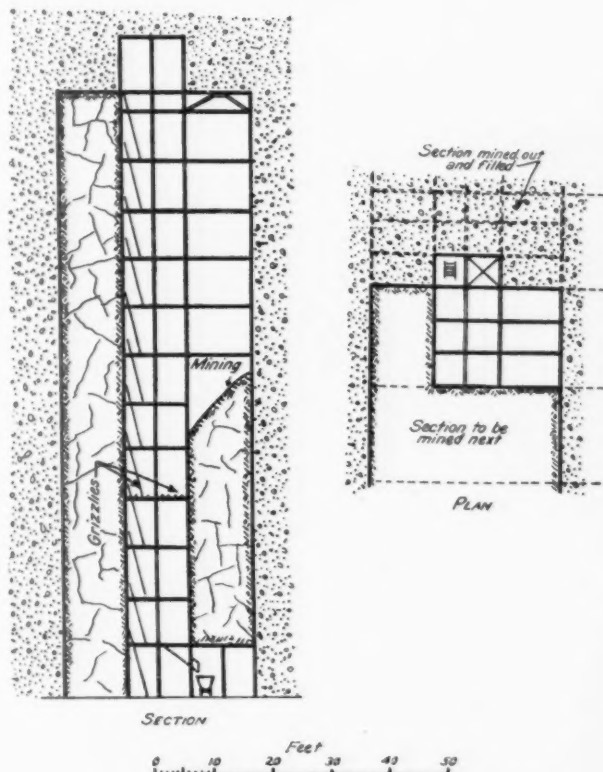


Plate 6

permitting complete extraction with practically no dilution. The system also allows careful prospecting of the walls which has resulted in finding many small, rich lenses of ore which would otherwise have been missed.

A plan and sections of a typical stope are shown in Plate 5. The width of stope sections varies from three sets in fairly solid ore to a single set where the ore is badly broken. The lengths of sections vary from 10 to 20 sets depending

upon conditions. Stope sections are mined as vertical slices 100 ft. high, from level to level.

Ore chutes are placed in every fourth set and, by the use of slides, broken ore flows to these sets by gravity, practically eliminating shoveling. The ore chutes are held open through the filled stope, and serve as fill holes for the next stope section. The frequency of successive waste fillings depends upon the weight developed as stoping progresses. Where

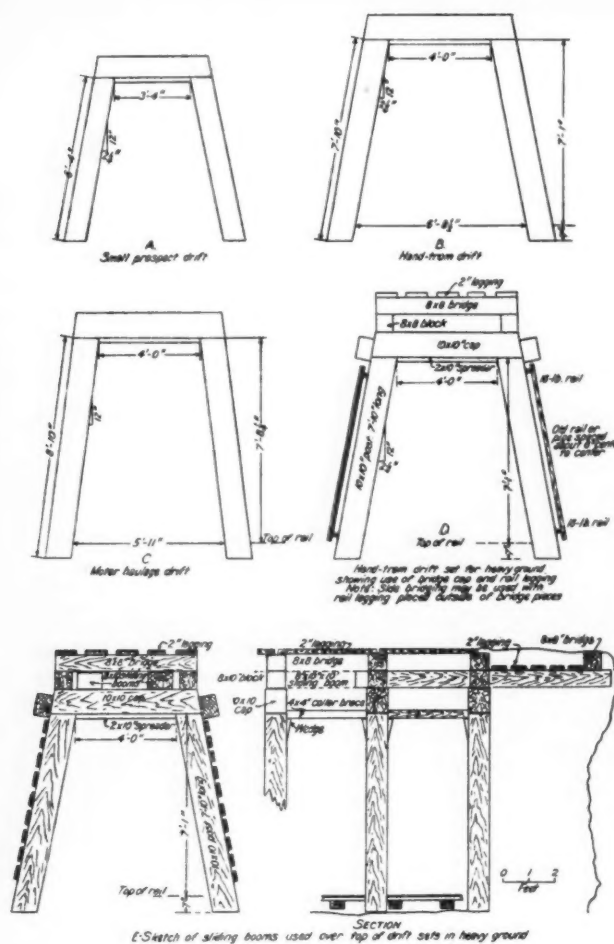


Plate 7

possible, several floors are removed before filling. In these cases, waste will flow into the open set by gravity and requires little hand spreading. Timbers are framed into standard lengths. Oregon fir timber is used. In the heavier sulphide stopes, the cross section of timbers used is 10 in. by 10 in.; in lighter ground, 8 in. by 8 in.; and on the heaviest sills, 12 in. by 12 in.

In removing pillars left over the main gangways in the main orebody, a modification of the Mitchell Slice method has been used. These pillars are usually about six sets wide and extend vertically from level to level. In many cases, the ore left in the pillars has been badly crushed. Also, the gob lagging against adjoining old filled sections is often found to be rotten and broken.

A single line of square sets is carried vertically upward through the center of the pillar to the level above. Mining now progresses downward between the square sets and one of the adjacent filled sections. Timbering consists of 10-in. by 10-in. stringers tying across from one side of the square sets to the timbers of the old section. After one-half of the pillar has been removed, it is filled with waste and the other half mined in the same manner. Pillar stopping is illustrated on Plate 6.

## DEVELOPMENT HEADINGS

Rock conditions in the mine vary from a very hard quartz gossan to extremely heavy swelling ground. In order to meet ground conditions, timbered drifts are driven in three sizes; small prospect drifts, ordinary hand tram drifts and motor drifts. In swelling ground, it has been found that by using old rails for lagging, the ground will squeeze between the rails without pressure on the set itself. Plate 7 shows standard methods of drift timbering. Methods of concrete and timber support used in the main haulage tunnel are shown on Plate 8. In a 4,000-ft. section of the main tunnel, gunite has proved an effective substitute for timber. All mucking is done by hand.

Three kinds of timbered raises are driven. The standard two compartment square set raise is used where it is to be followed by square set stoping. A small, cribbed raise, having two compartments—each 3-1/2 ft. by 3-1/2 ft. in the clear—is timbered with 3-in. cribbing. Heavier cribbed raises are timbered with 6-in. by 8-in. cribbing and have two compartments, each 4 ft. by 4 ft. in the clear.

## UNDERGROUND TRANSPORTATION

Main haulage levels are on the 1,400-ft. and 1,600-ft. levels. Five ton trolley locomotives and 30-cu.-ft. side dump cars are used for ore haulage. Tracks are laid with 30-lb. rails. Sixteen-cu.-ft. cars are used for hand tramming. On other levels, where working places are widely scattered, small storage battery locomotives are used for ore gathering and handling waste.

On the main haulage tunnel, ore is handled by a 25-ton electric locomotive, hauling trains consisting of 8 30-ton cars. At the portal of the tunnel, these are made into 16-car trains and taken by standard gauge steam railroad to the smelter, about 5 miles distant.

## HOISTING

Ore hoisting is done at the Audrey shaft, which reaches a depth of 50 ft. below the 1,700-ft. level. Skips are of 3-ton capacity. Men and supplies are handled by double-deck cages at the Edith shaft, which bottoms 50 ft. below the 1,900-ft. level. Both shafts are concreted. Each shaft is equipped with a 300-hp. Nordberg hoist.

## VENTILATION

A surface exhaust fan is installed at the top of a return air raise, extending to the 1,200-ft. level. This fan is a multivane, forward curved blade, centrifugal type, connected by belt drive to a 250-hp., 2,200-volt motor. It exhausts 100,000 cu. ft. of air per minute. In addition, a somewhat smaller fan is installed at the top of the air raise as an auxiliary unit.

Secondary underground ventilation is accomplished by using small, electrically driven blowers and 10-in. galvanized ventilation pipe.

## SAFETY WORK

A completely equipped mine rescue station is maintained. Rescue crews practice twice a month. Fire patrols are maintained on graveyard shifts, and places in which fire hazards exist are wet down three times a week. Adequate water lines for fire fighting are installed throughout the mine.

The safety engineer makes daily inspections and reports of all unsafe conditions. Educational safety work is carried on by safety bulletins and individual talks to the men by the safety engineer during inspection trips.

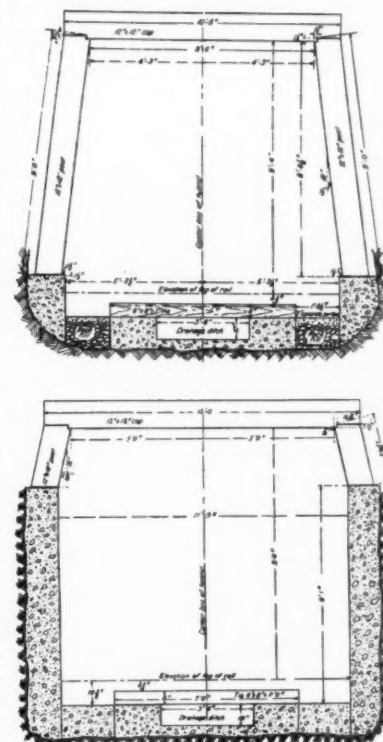


Plate 8



# THE COAL CONVENTION

## AND EXPOSITION

**T**HE twelfth annual convention and exposition of the Coal Division of The American Mining Congress, held at Music Hall, Cincinnati, Ohio, May 13 to 17, inclusive, 1935, will long linger in the memory of the coal industry as one of the most outstanding and valuable meetings ever sponsored by this group. It was a huge success from every standpoint; the attendance at the convention, as a whole and at the individual sessions thereof, was excellent; the exposition was one of the finest ever presented; and interest in both the convention and exposition was sustained throughout the entire five-day period. The records indicate that 509 coal companies sent approximately 2,000 of their operating personnel to participate in the discussions. The program was varied, interesting, and well presented. Some 78 papers and discussions were presented in the nine sessions of the convention and form a symposium of modern mining methods that offers the operating personnel of the industry much valuable information in cost reduction and efficiency.

The convention opened informally on Sunday afternoon, May 12, with a get-together in the presidential suite of the Netherland Plaza Hotel, which was attended by officials of the Mining Congress, the program committee, the exhibitors, and the local groups. The first session of the convention was Monday morning, May 13, with T. J. Thomas, president, Valier Coal Company, presiding. To this session were presented Julian D. Conover, newly elected secretary of The American Mining Congress; E. J. Newbaker, chairman of the Coal Division and vice president of The Berwind-White Coal Mining Company; Chas. F. Hamilton, chairman of the program committee and vice president of the Binkley Coal Company; Geo. R. Delamater, chairman of the Manufacturers Section and assistant vice president of The W. S. Tyler Company.

The program was divided into papers that adequately covered such important phases of production as Face Preparatory Methods, Loading, Transportation, Power, Ventilation, Drainage, Mining Systems, Surface Preparation, Safety, Management Problems, Machine Maintenance, Stripping, and Anthracite Problems.

J. A. Luse, Algoma Coal & Coke Company, stated that "A lower standard of living for miners will probably result in a general wage advance. If a wage

advance is made mandatory by law at a time when it cannot be supported by dollars in circulation, it will result in a general reduction of production and a lower standard of living. Humanity cannot be standardized as to its work day, its earning capacity, its intelligence, its security, its capacity to enjoy or improve itself, or to impart its benefits to all other mortals. General wage advances cannot make better the average standard of living for labor. If this wage advance is enacted by law at a time when it cannot be supported by dollars in circulation, it will result in a general reduction of production and a lower standard of living.

"The coal industry has gone much further than other basic industries of this country in voluntary and involuntary concessions to radical labor demands. These other industries still stand on the eight-hour-day basis, which is much more logical than the seven-hour-day, which we use. Their five-and-one-half-day week is much more prevalent than our five-day week. Coal pays much higher wages on the earnings basis than most industries, in spite of the fact that practically all of our labor is much less skilled and its standard of living lower, with living costs comparatively lower.

"In all the history of repressive labor organizations, there is nothing to encourage us to believe that the present downward trend will be met sensibly by labor leaders of this generation, until relentless retribution reminds the individual that his soul is his own, and his life his to lead in the interest of his own and himself."

R. B. Gilmore, Knox Consolidated Coal Corporation, in a paper entitled "Human Engineering," said: "The day is at hand when man shall himself come into the spotlight as the most important and essential element in the progress of industry. For many years industry has sponsored research by the greatest scientific and inventive minds in the world along mechanical lines. It is now high time for industry to take this same interest in human power or human interest. If the problem of human relationship in industries could be solved, the question of wage incentives would be secondary. There is the importance of good will. Human engineering is simply getting work done through people. And the first requisite of managing men is to know and understand them. The first requisite of an executive is that he be fair and interested in those working under him. Job standards which have

been developed in the industry can be held up as a mark to aim at. Time standards of so many units of work in a given time may become an object of record breaking. A man in order to work willingly must work because he desired to work from within, not because he is forced through economic pressure to carry out orders given by others."

K. L. Marshall, associate mining engineer, Safety Division, Health and Safety Branch, U. S. Bureau of Mines, said that "Any method which will increase the use of trained men to bring down coal, whether with explosives or mechanical devices, in a form available for handling; and which requires a well-planned, efficient, safe procedure, is a decided step forward.

"The breaking down of the major tonnage of coal is still being done by the use of detonating and deflagrating explosives. The Bureau of Mines has consistently recommended the use of permissible explosives as the best means for safety, but since 1927 the percentage of use of the three main types of explosives, permissible, black powder, and high, have remained about the same, resulting in many coal mines considered as non-hazardous having explosions of gas or dust."

"Indiana first began to seriously consider mechanical mining in 1928," said P. L. Donie, Little Betty Mining Corporation. "First installations were handicapped with small mine cars, light rails, and shortage of mine cars. It was soon learned that more mine cars were necessary in mechanical mines. Heavier rails helped to overcome some of the troubles. The old system of double partings was abandoned. Indiana mines throughout the history of mining, have continued the room and pillar system. Therefore, in mechanical mining to successfully operate, we are compelled to keep the gathering motors as near the loading machine as possible. Mechanical loading and gathering of coal also requires careful attention to electrical power as well as to bonding and sufficient wire. I would suggest that the gathering motor be used to gather coal and not for line haulage; power attention used to assure full voltage requirements of loading machines and haulage motors; good track equipment properly laid to insure safety and avoid delay; telephone communication in good condition and, last but not least, enough foremen for constant supervision of each mechanical unit, who have sense, pep, and interest enough to keep the machinery in operation."

"'Know your product' is a slogan that should be adopted if marketing of coal is to be carried out intelligently and effectively," said David R. Mitchell, assistant professor of mining and metallurgical engineering, University of Illinois. "Many consuming plants have established a relative scale of values to aid in economical buying of their coal requirements. The establishment of such values are dependent on moisture, ash, and B. t. u. values. The relation of dry ash to dry B.t.u. is worked out from the efficiency data found. Moisture may affect the value of coal in three ways. It directly changes the B.t.u. value of the coal. It reduces the heat available from combustion by the amount necessary to vaporize the water and heat it to stack temperatures. And it increases the volume of stack gases. If washed coal is drained or dried to approximately the same moisture content of raw coal, the moisture content need not be considered in evaluating washed coal in terms of unwashed.

"Ash directly affects the B.t.u. content of the coal in proportion to the amount present. Also there are additional heat losses due to high ash because of loss of carbon in ashes, loss of carbon up the stack, loss of sensible heat in the ashes, and a general increase in operating cost and drop of plant efficiency. B.t.u. values are in approximate relation to ash content. Efficiency values may be obtained for any plant by

the relation  $100 \times \frac{\text{Effective B.t.u.}}{\text{As fired B.t.u.}}$   
It is probable that if the actual ash reduction is small at the cleaning plant, there might not be enough increase in value to pay for the cleaning. The increase in value of low-ash coal over high-ash due to including investment charges is of the order of 2-3 cents per ton for each percent of ash decrease."

"I am satisfied that there is a method of mechanical loading applicable to practically all coal mining operations," said Geo. B. Pryde, vice president and general manager, Union Pacific Coal Company. "Shaking conveyors with a Duckbill would seem to meet the needs of the various conditions in a large number of mines. Many who have investigated this system of loading coal have installed the shaking conveyor at their properties with very satisfactory results. It takes faith in any enterprise to make it succeed, and courage to break away from established customs and traditions. The installations of shaking conveyors will pay continuing dividends, and a large measure of satisfaction that comes from being able to do something for an industry that has been more or less static for a long period of time. We have 153 mechanical loading units of all kinds in our mines, 147 of which are in actual operation, the other six being held for emergency. In the beginning of our mechanization program, a cardinal principle was set up, that no employee should be displaced to make room for a loading machine. The long apprenticeship of training a young man to become a miner under the old system of things is now obsolete. With the greater use of mechanical loaders in mines, the labor problem is simplified, inasmuch as young men with no former training in mining can be placed on loading machines infiltrated with trained men, and in a few months de-

velop into excellent workmen. During the past two years we have employed about 400 such employees, with the most satisfactory results."

"The machines used in mechanized mining have saved hundreds of dollars and many hours of time, and are a great deal safer than the old hand methods," said Gomer Reese, general superintendent, Kemmerer Coal Company. "In the year 1932, during the preliminary work in the development of the Gomer Mine of the Kemmerer Coal Company, it was determined that the seam pitched 20 to 25 degrees due west. After sinking the main slope a distance of 800 ft. on the pitch, we were convinced that it was not only a slow but costly job to sink by the hand method. This led to the development of a slope sinker. To our astonishment it worked for 30 consecutive days of three shifts each, and at the end of this period we had sunk 800 ft. of main slope,  $5\frac{1}{2}$  by 12 ft., and had broken off four entries 50 ft. each of the same dimensions. We also have a special rock dumping machine, which consists of a turn table, hydraulic cylinder, oil pump, and an electric coal drill motor. The machine sets in the middle of the rock dump track and the cars are spotted on it against the stops by the locomotive. The motor trip is disconnected and the machine swung at right angle to the track. The switch is thrown in, the car then dumped spilling the rock over the side of the rock dump. This consumes 25 seconds. The valve lever is then reversed, oil allowed to by-pass, and the car rights itself. The machine is given a quarter turn, car released from the stops, and the motor man signalled by the rock dump man. Then they proceed to spot another car."

"There are 10 great advantages in the use of the Time Clock and Recorder," said E. B. Agee, superintendent, Dehue Mines, Youngstown Mines Corporation. "These are: positive check at all times of number of employees in the mines, and who they are; an accurate record by dates and hours of time men are actually in the mine; protection to both employer and employee; a check against foreman's pay book; elimination of payroll padding; promotion of punctuality; registration which cannot be removed or altered without detection; an accurate record of legitimate injuries; reduction of compensation costs; and the promotion of safety by making men think of safety daily," he continued.

"Five years ago we installed clocks at the Dehue Mine of the Youngstown Mines Corporation. Prior to the installation many complaints were received from employees that their paychecks were short in time. After time clocks were in for a short time, employees complaints for time shortage were practically eliminated. We further installed an accident clock at the same time, making it compulsory for an employee to report at the end of his shift whether injured or not. Such a record cannot be changed and is incontestable by claimants for compensation. Coal mining companies have paid out thousands of dollars for compensation and treatment of injuries that did not occur in or about the mine. I am told that 25 percent of all compensation

paid by coal companies is due to injuries received outside the mine and after working hours, not in the line of duty. This figure seems unusually high and cannot be verified. However, the installation of an accident clock will automatically stop all such fraud and will make the recording of minor injuries positive, and provide care for every man injured while on duty."

"Mining has in the past progressed through cooperation with the scientist and the builder of tools and equipment, and should progress more rapidly and efficiently by closer cooperation between the operator and manufacturer," said R. H. Morris, general manager, Gauley Mountain Coal Co. "A great good could be accomplished by encouraging the engineers and representatives of manufacturers to make more observations of their machines under actual working conditions. I feel certain that there are new and valuable ideas developed by the operating men about the mine, which if encouraged would be of value to the individual, the manufacturer, and the industry. These individual ideas if new can only be made useful by being put into use. I believe we need a closer study of the actual performance of the machinery, which necessitates a close cooperation between the two parties. Such improvements originated by scientists as steam engines, safety lamps, and rock dusting have made mining possible. To continue we must have today a closer and greater cooperation between the operator in the field and the manufacturer of the equipment and supplies he uses."

"We have not yet fully realized the true import of developments in Man's most willing and obedient servant, steam," said Frank N. Becker, Jeddo, Pennsylvania. "The technical advances in steam generation and utilization have not been confined to the power companies. They are reflected to a lesser degree in the modern industrial plants. Decreased coal demands are indicated. Water power will unquestionably become more important as government money is made available to develop the latent power of the streams. Refinements in power transmission are permitting more remote sources of such power to be developed. Fuel oils, especially the heavy tars, are making important gains in steam generation. Changes in refinery practice will make more low priced material available. The fuel oil engine is the most potentially potent competitor of coal. Each day it becomes more reliable and less complicated. Today, because of limited output, they are unimportant. Tomorrow they may rule the kilowatts."

"The coal tippie and washery units to be described are situated in Illinois, in the neighborhood of Marion," said Merl C. Kelce, general superintendent, Delta Coal Mining Company. "Coal is obtained from the Illinois No. 5 seam, which is relatively hard and unusually free from bone material. Mining the coal is carried on under the open pit system, an electric shovel digging the coal and dumping it into a 15-ton hopper-bottom trailer truck. A reciprocating feeder is operated through a variable speed transmission



remotely controlled by a washbox operator. The screens are driven through a V belt drive to a fly wheel type pulley on an eccentric shaft and two pairs of opposite throw cams. The picking tables are of the reciprocating type. They are driven at a speed of 120 r.p.m. by tubular connecting rods from a single eccentric shaft on which the cams are set at 120 degrees. There are four hinged loading booms.

"A comparison of specifications and actual performance might be interesting. The over-all capacity of the entire plant is rated at 400 t.p.h. It is doubtful if the plant has ever handled a smaller amount than this. The washer box is the largest single box of its kind in the world, and was designed to handle 175 t.p.h. Repeated tests of the raw coal conveyor show that coal is being fed to the washer at rates averaging about 250 t.p.h. In spite of handling this great over-load, the washer is turning out a cleaned coal which is exceptionally free of undesirable material and a refuse in which the percentage of material which would float at 1.50 is very low. The average ash content of 3" by 0" raw coal is slightly over 18 percent. Analyses of the washed product have shown that the ash has been reduced to the amount of ash inherent in the coal at a 1.50 gravity. In one instance, it was necessary to add 3/4" x 0" raw slack because a customer registered the complaint that the washed coal he had purchased was so low in ash as to endanger his grates. The moisture content of 3/4" slack is low enough to reduce to a minimum the possibility of coal freezing in cars in the winter."

Max Tuttle, Knox Consolidated Coal Corporation, in a discussion on fly ash and the treatment of coal to improve its quality, said, "Fly ash, which causes tube slag and brick work erosion, has a different chemical structure from the composite ash. Yet we expect to treat the ash on the grates and the fly ash with the same process. We expect to create an unnatural chemical condition in the fuel bed and carry it through the boiler, in spite of the fact that just at the top of the fuel bed we have every conceivable agency for changing any chemical structure. In the efficient processes of burning coal, man has worked with nature and not against it. Occasionally a new face appears on the horizon with a new idea, which does not have behind it the advantage of years of progress. This new face creates a small disturbance, but in the end, either lines up with the traditions of the industry, or falls by the wayside."

"Cellophane wrappers have increased neither the sale or quality of cigars. Chemical treatment of coal started with a surplus of calcium chloride in the chemical industry. Neither the coal industry or the consuming public asked for it or even thought about it. I have noticed that when a coal company starts treating coal they always seek new accounts, instead of giving their regular accounts the advantage of their improved product. Are we not expecting too much? We want salt strong enough to continuously attract moisture and still weak enough so as to be dry and non-corrosive. We expect to take a by-product of the coke and gas industry, calcium, and add it to other coal which already contains too much calcium."

"The earliest form of briquetting goes back into ancient history," said P. F. Herrly, vice president, Panda Briquet Company. "The modern method of briquetting of coal had its start in France, Germany, and Belgium during the 19th century. Really good coal being relatively scarce and too valuable to be burned as fuel, briquetting was developed as a means of using cheap, low-grade coal. Generally speaking briquetting done in this country is all done with roll type, continuous output presses. In a few places they are made on an extrusion type press, which makes them in much the same way that macaroni is made. A briquetting plant recently built in Ashland, Wisconsin, represents a decided step forward. Definite control was emphasized in its design. Automatic weighing and measuring machines are in constant use. This makes it possible for the first time to produce a briquet with the same unvarying binder percentage day in and day out. Automatic temperature control devices were installed together with elaborate thermostats. With centralized automatic control of all the machinery, labor costs were reduced to an unbelievably low figure. This plant required only five months to complete and a week to put into operation. This being an age of specialists, successful briquetting becomes a highly specialized subject. Only when the problem is approached in this frame of mind, can it become successful."

"Coal operators are realizing more and more the constantly growing value of dustless coal as a sales stimulant to both domestic and industrial consumers," D. Jamieson, Jr., superintendent, Lincoln Coal Company, told the delegates. "The marketers and distributors of natural gas and fuel oil have been able to make heavy inroads into our coal market by stressing the cleanliness of their respective fuels. The value of dustless coal to the industry is now well recognized. The question of whether to dedust at the mine or the dealer's yard is a problem yet to be solved. Operators believe that calcium chloride and mineral oil are the most effective agents used in dedusting coal. Tests at our mines have shown that an average of 75 percent of the objectionable dust from coal may be eliminated by proper treatments. The results are influenced by: quantity of material used per ton of coal; size of coal treated; method of application; and amount of handling between point of application and consumption."

"The chemical treatment of coal which has a low ash fusion temperature, containing a high iron sulfide, is materially assisted during actual combustion, caused by changing of the iron sulfide to a ferrous or ferric state," O. B. Pryor, general superintendent, Elm Grove Mining Co., stated when discussing "Chemical Treatment of Coal":

"Due to the clinker formed with treated coal moving on the grates and tuyeres, a more even firebed can be maintained, reducing to a minimum blow holes which are the cause of hot spots. This condition results in the better distribution of air, giving a more uniform CO<sub>2</sub> rating. Greater burning rate per square foot is also obtained."

"The treatment of our domestic size coal has shown it to be of added merchandising value in that the coal has been made dustless, that there is a great reduction in smoke and soot."

"Coal seams in the western extremity of the Southern Anthracite coal field are found in a long narrow basin, the depth of the lower seam being 3,000 ft. below sea level," W. B. Geise, mining engineer, Susquehanna Collieries Co., told the delegates. "The property discussed in this paper was originally opened in 1832 by means of slopes in the seams and the coal was mined by levels, being transported to the surface in mine cars. At elevation of sea level the pitch of seam increased. Consequently, a 4-compartment shaft was sunk, and also a rock slope. It was found impossible to maintain openings in the seam for haulage, so gangways were driven in the rock under the seam on each level. Sectional cross-cuts were driven at intervals of 800 ft. from the rock gangway to the seam. On completion of the crosscut a gangway was driven in the seam. Chutes and headings were driven as the gangway advanced to provide ventilation, the chutes being spaced at 50-ft. centers. Next, a battery was placed on the high side of the heading opposite each chute, and slant chutes were driven, heavily timbered. The amount of coal drawn from these chutes varies from 1,000 to 3,000 cars, having a capacity of 115 cu. ft. each. The explanation of such a large difference in the yield from different chutes is that the top breaks somewhere up in the pitch, blocking the coal above. In many instances a large amount of this coal will come down in the next chute. Occasionally a series of heavy bumps occurred, releasing great quantities of methane gas. These bumps were accompanied by a rumbling noise. Ventilation was provided by exhaust fans on the surface, with an auxiliary force fan in each rock gangway."

"The life of an 800-ft. section in this type of mining is 12 months. To maintain the proper sized opening heavy timbering is necessary. Since methane gas has been released in large quantities following heavy bumps, it has been the practice to employ electric haulage only in the rock gangway and cross cuts, which is the intake airway. The breast and pillar method of steep pitch mining is used more extensively throughout the anthracite field by different companies for the reason that the character of the seams will not permit the use of the 'mining by slants' method in view of the fact that the coal will not run freely."

"Multiple shifting to some degree has been resorted to since the Stone Age," said D. D. Dodge, V. P., W. J. Rainey, Inc. "Unless mining conditions are ideal, there is question whether production can be increased much more than 80 percent by multiple shifting. Where mining is done by hand, production can be doubled or trebled by double or treble shifting, with as much coal produced on each succeeding shift as on the first one. We recently had occasion to eliminate one shift on a double shifted section. Inside of a week, the production of the single shift increased about 10 percent and costs were reduced a like



percentage. Multiple shifting, by having an extra place for each man or pair of men, does not seem to present any serious problem to accomplishment. However it does require more open territory with consequent higher costs for supplies. Multiple shifting on a concentrated basis, cuts to a minimum capital expenditure for equipment; facilitates haulage; and facilitates drainage and ventilation."

"Efficient drainage has become one of the most difficult problems facing the present-day mine manager," said E. H. Shriver, Assistant General Superintendent, Raleigh Coal & Coke Co. "The most desirable location for the surface plant of a mining property, with respect to its draining and haulage systems, is at the lowest point in the elevation of the coal beds. When a property is projected, the general scheme should receive as much thought and study as is given to the haulage system. The open ditch is the most dependable and most often the most economical method of disposal of large quantities of mine water. The grade should be sufficient to make the ditch self-cleaning. As the mine is developed and swags are encountered, the systematic connecting of the swags with open ditches or even short drainage tunnels, should be considered a definite part of the mine development. The siphon line is next to the open ditch in dependability and economy. The best application of the siphon is where a section is making water to a more or less definite amount. Reciprocating pumps have of late years been regulated to the task of keeping the working faces dry until the local swags are developed. The centrifugal pump has come into universal service for moving large amounts of water, where pumping is necessary. During the past six years a new type of pump has found its way into the coal fields, known as the turbine pump. The power unit is located on the surface, while the pump units are at the bottom of the bore hole or shaft. The simplicity of the unit, the fact that it is self-contained and can be completely installed from the surface has made this type of pump very popular in the de-watering of mines."

J. D. Doherty, Research Engineer, the Koppers Coal Co., Inc., told the delegates that there has been a steadily increasing demand for treated coal. "During the first three months of 1934 considerable run of mine was treated without charge because of contracts in effect. A comparison of the same months of the previous year indicates that there has been an increase in the demand of coal treated with calcium chloride at the mines in addition to the number of dealers treating coal during the same period. Calcium chloride solution provides a liquid film, non-drying under most conditions, at low cost. It has, therefore, been used extensively for preparing dustless coal."

R. R. Kirkpatrick, Superintendent, Standard Coal Company of Utah, in discussing Utah coal operators' problems, said: "Utah coal rests at angles from

4 to 8 degrees and is badly disturbed through faults, dikes, and wants. This condition has made correlation of seams difficult. Gas and dust is found in many of the mines, and Utah coal dust is rated the most explosive in the world. Safety orders under which we are now working are considered to be more strict than those of any coal mining state. The solution to this picture from the various ills from which we are suffering is intensive, concentrated mining from relatively small areas by the employment of mechanical loaders and multiple shifts."

L. Russell Kelce, vice president, Hume-Sinclair Coal Mng. Co., in his discussion of "Modern Truck Haulage in Strip Mines," said: "In developing a new strip property, we purchased seven two-ton trucks, each to pull a six-ton semi-trailer with automatic doors in the bottom to dump the load. We built roads of burnt mine shale as a base and covered them with four inches of crushed gravel, keeping grades to a maximum of 8 percent on short hills and 5 percent on long grades. After 90 days' trial we found we had established the costs planned and estimated. \* \* \* Later we purchased a 17-ton semi-trailer, using a tandem axle to carry the load. This unit weighed 13,800 pounds and loaded 47,800 pounds. We purchased a seven and one-half-ton tractor truck weighing 12,200 pounds, making a gross load of 60,600 pounds. \* \* \* This was too heavy and caused trouble maneuvering in the pit, so we changed to trucks and trailer with a gross load of 53,000 pounds \* \* \* these units proved satisfactory. Our companies (after considerable experimenting) are now operating the following semi-trailer units: Six 6-ton, two 10-ton, four 12-ton, 20 15-ton, one 17-ton, one 20-ton—in all 54 units with 441 tons of capacity. Total tonnage to be hauled in 1935 is 1,625,000 tons; total miles to be traveled will be 488,446 for 118,500 trips."

A. F. Castanoli, Koppers Coal and Transportation Company, discussed "Layer Loading," a new practice in loading coal at the tippie, saying "basically, layer loading provides for shuttling two to four railroad cars in tandem, by means of a hoist, past the loading point two or more times at the discretion of the inspector, the object being, first, to prevent an excess of either desirable or inferior coal from entering any single car; second, to prevent segregation of lump from fines; third, to prevent excessive degradation. Its purpose is to achieve uniformity both by car and in cross section."

C. F. Keck, safety director, Jamison Coal & Coke Co., said that "multiple shifting" can be advantageous in (1) increasing speed of development work in new areas, (2) faster retreat work in gob areas where neglect of proper timing has not kept retreat work on schedule, (3) straightening gob lines which have become out of step, (4) increasing output from working places, (5) increasing output from plant, (6) increasing output of desired prepared sizes, (7) increasing output of quality coal from certain areas."

James Hyslop, chief engineer, Walter Bledsoe & Company, discussed "Power Distribution to Concentrated Mining Panels," and urged that the point has been reached where it is imperative that the high voltage distribution system be kept within 1,000 to 1,500 feet of the working face, and that the old practice of having a vast network of heavy D. C. feeders be abandoned. He believes that the new system will have to provide for sub-stations of smaller size; they will have to be moved very frequently and should therefore be portable; the A. C. distribution system (usually 2,300 volts) will have to be very flexible and readily accessible for tapping at various points. The D. C. feeders to the various sections should be kept separate and independent if possible."

Newell G. Alford, Eavenson, Alford & Hicks, presented a comprehensive paper upon "High Lights in Coal Cleaning in 1934." He reviewed all systems now in use, and said: "There is a marked upward trend in the percentage of the produce tonnage of mechanically cleaned coal within the last two years, and a persistent annual increase through the last eight years; total tonnage cleaned in the entire United States in 1934 was greater than in any previous year."

M. A. Evans, Koppers Coal and Transportation Company, discussed the question of handling cars on conveyor loading, and pointed out that haulage constitutes the major cause of all delays to the conveyor at or beyond the loading point, and haulage delays may be considered as a symptom that the method of handling cars needs to be remedied.

Carel Robinson, Kelly's Creek Colliery Company, presented a paper upon "Illumination in Relation to Preparation at the Face," and gave the results of a series of tests his companies have conducted in behalf of obtaining cleaner coal through proper lighting and proper ventilation at the face.

M. H. Forester, Consolidation Coal Company, discussed "Cleaning at Face vs. Tipple" and said: "Face cleaning cannot be successful without rigid and constant supervision. The supervisory organization must be 'clean coal-minded' and thoroughly informed on what is demanded in the way of performance. Tipple cleaning is more readily supervised and controlled, but even so may show irregularities in performance if the urge for tonnage and cost becomes too dominant."

P. H. Burnell, superintendent of the Owl Creek Coal Company, discussed their mechanical loading system, which he said consists of driving places 300 ft. apart between the levels and blocking it out in 100-ft. blocks, working a 100 ft. face for 80 ft., then leaving a 20-ft. pillar. In this system five shaker conveyors are used, and four cutting machines. \* \* \* Mechanical loading has a

tendency to reduce accidents, he said, due to the fact that more skilled labor is required to operate the new mechanical devices and closer supervision is necessary, due to the rapid progress. Ventilation, sprinkling, rock-dusting, timbering are all given closest attention."

W. W. Dartnell, manager of mines for the Valley Camp Coal Company, presented a discussion of the problems involved in main line haulage. At his company they have installed 75-pound rail, and laid their track on creosoted cross ties. The width of each tie is seven inches and the width of the rail four and thirteen-sixteenths inches, giving a bearing surface of 33.69 square inches per tie, or 606 square inches for each rail length, and 1,216 square inches for the track of one rail length. Allowing 1,000 pounds per square inch as the supporting strength they have a total supporting strength of over 600 tons for one rail length of track; and using safety factor of 10 to 1, it gives 60 tons, which is above the loads encountered in the average mine. By systematizing and training the track crews they lay as much as 900 to 1,000 ft. of track in a 24-hour period. In order to do this they use three shifts. The labor cost in relaying a foot of this type of track has varied from 25 cents to 35 cents, and this includes the work of tearing up old track."

"Modern Mine Ventilation" was presented by A. W. Hesse, chief engineer of coal mines, the Youngstown Sheet & Tube Company. He said that the basic problems of proper ventilation include (1) the quantity of air required, (2) the laws governing the flow of air, (3) the means of inducing the flow of air. "At no time should the air in a working place be allowed to contain 1½ percent of methane when measured four feet back from the face and ten inches below the roof. \* \* \* 80 percent of the volume supplied by the ventilating fan should reach and be distributed through the various splits. \* \* \* Mr. Hesse discussed the various types of fans and the very great forward steps made in the improvement of power-driven fans."

W. H. Lesser, James H. Pierce & Co., discussed "Your Equipment and Its Relation to Profits." Things to be especially considered in relation to equipment and profits, he said, are power contacts; power factors—single phase vs. three phase transformers; consolidation

of metering points; power generation; electrification of isolated steam plants; motor generator sets and rotary converters; loss in transmission of power; fan modernization; pump improvements; haulage costs, and the proper use of materials; mine cars, and maintenance of equipment.

T. W. Gray, Pittsburgh Coal Company, discussed "Locomotive and Mining Machine Maintenance," and the use of one large centrally located shop, with separate shops located at each mine. He pointed out that electric welding has revolutionized methods of handling maintenance costs. Cost records for five most important mining machine parts reclaimed show that the reclaimed cost is only 41.5 percent of the cost of new

mechanical or stoker-fed coal burners on the market. It is, of course, fundamental that such burning equipment will operate more dependably, more efficiently and more flexibly when it is fed with a fuel best suited for it. In fact, the demand for accurate sizing is becoming more and more rigid with less and less tolerance for the permissible over and undersize quantities in each and every particular size range. In order to produce what we call 'New Stoker Coal,' of about 1¼" by ¾", various operators have had to add to, or otherwise radically alter their sizing equipment. In most instances some types of vibrating or other rapidly moving screen surface screen had to be installed to meet this demand with any degree of satisfaction."

Dr. L. E. Young, vice president, Pittsburgh Coal Company, in discussing "European Methods as Applicable to United States Production," told the delegates, "The use of conveyors has been increasing very rapidly in Europe. In Britain the tonnage handled by conveyors in 1933 was 62,000,000, which was two and one-half times as much as in 1928. The last official British report (1933) shows 3,717 coal-face conveyors, 1,039 gate conveyors, and 564 gate-end loaders. At an English mine, when I commented on the large expenditure which was being made on a conveyor loading station, I was told that the loading head would be in service at that point for twelve years, and would handle 2,500,000 tons during its location at that point. At a mine near Sheffield, there was one straight face 2,700 feet long, and on it were three pairs of face belts, each belt 450 feet long, discharging to so-called gate-loaders; these face belts were advanced daily. This means concentration, coordination, well-trained workmen, and splendid supervision. In the Sheffield district I saw in several offices of operating officials, small black boards on which were entered, hourly, the number of cars loaded at each important loading head in the mine. These bulletins showed also the production on each of the preceding shifts during the 24-hour period. The flow of coal from each producing unit was reported by telephone from each loading head, and there was evidence that the organization was highly efficient."

In discussing "Water Clarification for Coal Washeries," H. F. Hebly of Allen & Garcia Company said: "The ever-increasing demand for mechanically cleaned coal is forcing greater attention to be paid to the necessary auxiliaries

## Toast to Coal

You have asked me to respond to the toast to "coal," the greatest boon of a generous Creator to mankind. I have seen it under the alchemy of science transmuted into thousands of new and useful forms—fuel for metallurgy and the fabrication of metals, heat for the fireside, light for the darkness, energy for the gas engine, motion for the locomotive, power for the factory, fertilizer for the plants, ice refrigeration, fungicides and germicides for sterilization and fumigation, a solvent for shellac, a preservative for wood, a cleanser for cloth, an aseptic for wounds, poisons for parasites and bugs, medicine for man and beast, flavoring for foods and confections and scent for perfumes and cosmetics.

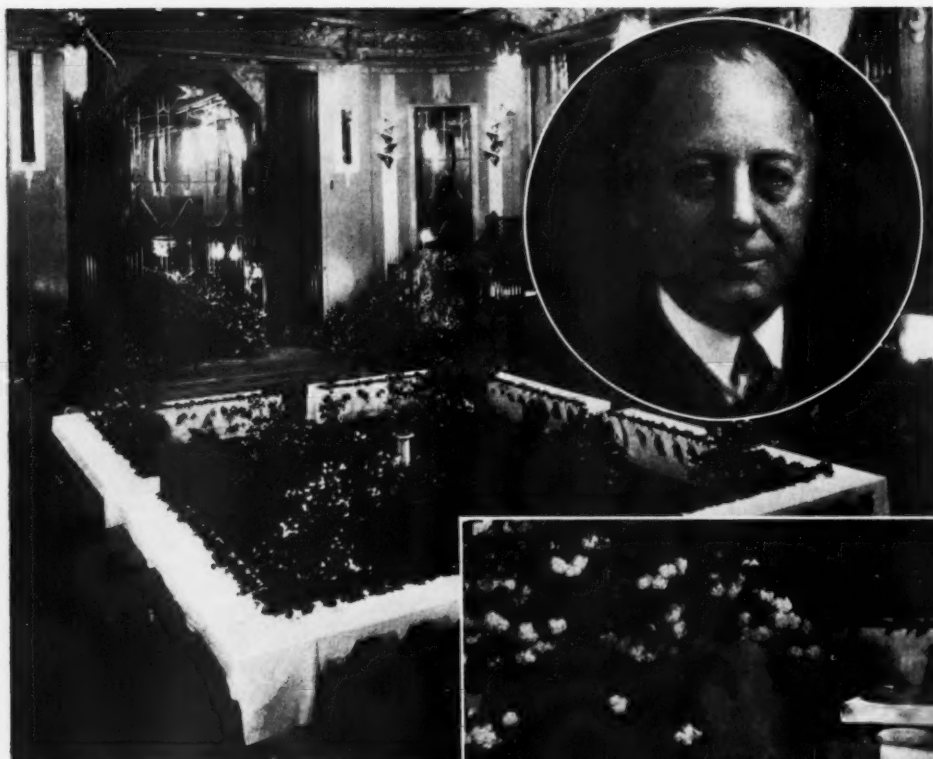
Thus, through human touch, I have seen it become comfort in the home, or death at the battlefield, and yield a corrosive acid that burns like fire or a sweetness that makes sugar seem insipid. I have seen it transformed into colors that make the rainbow envious of their brightness and variety, and I have seen it changed into explosives that make the thunderbolts jealous of their power.

I have seen it flow from the mouth of many mines, in a somber stream of potential energy, to operate the steam-driven generators so that the wheels of industry continued to whirl, without interruption. But, Ladies and Gentlemen, I want to say to you now, that as a means of livelihood, it's a damn failure.

*Presented by Chas. F. Hamilton*

parts. Lubrication plays a very important part in maintenance work.

H. L. Griffin of the Federal Division, Koppers Coal and Transportation Company, in discussing "Modern Coal Screening," said, "For many years coal preparation has demanded ever increasing attention from operators, especially from those producing commercial coal. Lately customers are becoming more and more particular as to both cleanliness and sizing. The very intense competition between coal and other fuels has provoked much thought and discussion and has resulted in intense research towards making coal more attractive as a fuel, by developing more efficient, cleaner and more automatic coal burning equipment. As a result we have, today, many small



*Sun Dial  
Breakfast  
in honor  
of Chas. F.  
Hamilton,  
Chairman,  
and the  
Program  
Committee*

which are required by coal cleaning equipment. The dry cleaning plant has its dust collecting system, while the wet cleaning installation requires its drying and water clarification systems. In all coal cleaning systems using water, there will be a gradual building up of suspended solids in the wash water, because of the fine coal present in the raw feed to the washery equipment. If a plant is so favored in location and natural resources that there is such an ample supply of water that the dirty water can be wasted in its entirety, then no clarification problem exists. However, very few plants are allowed to pollute the streams with dirty effluent, consequently some type of clarification is necessary. In localities where water is scarce, a closed system is practically imperative. The rapid increase in suspended solids in such an arrangement brings about an increase in the specific gravity of the wash water and tends to increase the viscosity of the same. Also, if the concentration of solids is too heavy, there is a tendency to lower the efficiency of the washer, and spoil the appearance of the washed coal product by leaving a dull, greyish coating of fine material on the product. The suspended material tends to be deposited on the fine sizes during drainage and increases both the drainage time and the moisture retained in the product. Each coal being treated presents a problem peculiar to itself."

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Chas. F. Hamilton, chairman of the program committee, is to be congratulated upon the very efficient manner in which the convention was handled. In developing the program he had the as-



sistance of an able corps of men representing every field of production—men who accepted their responsibility and left no stone unturned in making the meeting a success. This convention and exposition offers one of the finest examples of what real cooperation can accomplish. Assisting Mr. Hamilton was the committee on arrangements, chaired by Maurice D. Cooper, of the Hillman Coal and Coke Company. This committee was composed of 10 members, 5 representing operators and 5 representing manufacturers. Their job included everything from welcoming the delegates to the final handshake and golf tournament on Friday afternoon. F. F. Jorgensen, of The Consolidation Coal Com-

pany, and Wm. E. Goodman, of the Goodman Manufacturing Company, were responsible for "welcome on the mat"; W. W. Dartnell, Valley Camp Coal Company, and Geo. H. Morse, Union Collieries Company, did yeoman service in building attendance records at both the convention proper and the individual sessions; Chas. W. Connor, of the Nellis Coal Corporation, and Frank E. Mueller, of Roberts and Schaefer Company, entertained at the "Open House" party; Kenneth A. Spencer, Pittsburgh and Midway Coal Mining Company, and E. A. Williford, National Carbon Company, were hosts at the annual dinner; W. D. Turnbull, Westinghouse Electric and Manufacturing Company, directed the



famous "Our Gang" entertainment; Glenn H. Eddy, of Ohio Brass Company, started out to be chairman of the prize awards committee but severed his connection with that company before the convention opened; he was followed, most ably, by Louis J. Ott, advertising manager of the Ohio Brass Company.

The entertainment features of this year's convention were most happy selections and were original. They were largely attended by delegates. On Monday night "Open House" started the activities, with Chas. W. Connor and Frank E. Mueller, hosts. Prizes were awarded the "lucky dance" ticket holders, which included beautiful Bronson cigarette cases for both ladies and gentlemen. Tuesday night W. D. Turnbull rounded up "His Gang" and presented one of the best amateur performances this group has so far presented. Among those presenting unusual talent were: Mrs. Joe Joy, of the Sullivan Machinery Company, and Mrs. A. W. Dickinson, The American Mining Congress, each of whom played and sang; C. W. Waterman, Jr., of the McNally-Pittsburg Manufacturing Corporation; William Lynn, of the General Electric Company; P. H. Grunnagle, of the Westinghouse Electric and Manufacturing Company; young Elmer Voelkel, of the Utility Conveyor and Mine Equipment Company; and many others.

Wednesday night the "Riviera" feature turned out to be a hit. Eighteen coal companies presented, in a bathing beauty contest, 18 lovely girls, who wore the banners of their famous coals. The prize was won by the Hume-Sinclair Coal Mining Company, with Miss Dorothy Duncan, local Cincinnati girl. Second prize was awarded the Pond Creek Pocahontas Company; third prize, the Bell & Zoller Coal & Mining Company; and

fourth prize, the Koppers Coal and Transportation Company.

The annual dinner on Thursday night set a new record for entertainment. Barton R. Gebhart, assistant to the president of Appalachian Coals, Inc., served as toastmaster, introducing a distinguished number of mining men, both coal producers and manufacturers. At this dinner the prizes were awarded in connection with the prize contest of the meeting, as follows: Frank D. Piazza, Penelec Coal Corporation, golf bag; C. C. Ballard, The New River Company, serving tray; Robt. L. Newton, West Virginia University, gladstone bag; and J. W. Kyle, West Virginia University, cocktail set. Throughout the week the entertainment featured Glenn Lee and his famous "Lee-way orchestra."

An innovation, and a real high light of the convention, was the Friday morning session, when such distinguished guests as Howard N. Eavenson, of Pittsburgh, and Dr. C. K. Leith, vice chairman of the planning committee for mineral policy, Natural Resources Board, spoke on the future of the coal industry and the proposals to be made in behalf of minerals by the above mentioned committee. Dr. Leith's paper appears in this issue. Mr. Eavenson's paper will be a feature of the Year Book on Modernization, which will be ready for distribution about July 1. Among the important officials of the mining industry participating in the discussion following Dr. Leith's paper were: J. D. A. Morrow, president, Pittsburgh Coal Company; Hubert E. Howard, president, Binkley Coal Company; Ralph E. Taggart, vice president, Stonega Coke and Coal Company; Eugene McAuliffe, president, Union Pacic Coal Company; R. C. Allen, vice president, Oglebay Norton and Company; E. J. Newbaker, vice president,



Barton R. Gebhart, Toastmaster

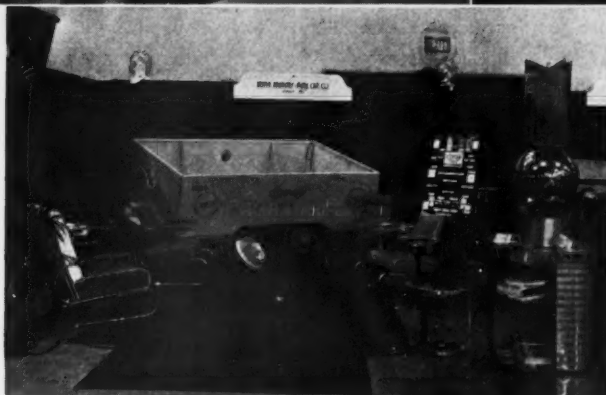
The Berwind-White Coal Mining Company; Paul Weir, vice president, Bell and Zoller Coal and Mining Company; M. L. Garvey, of the Pocahontas Fuel Corporation; and Louis C. Madeira III, representing the anthracite industry.

Another interesting feature of the convention was the Sun Dial Breakfast in honor of the chairman, Mr. Hamilton, and members of his committee. Breakfast was served in a beautiful garden setting and was presided over by Paul Weir, of the Bell and Zoller Coal and Mining Company.

Each year, and particularly the past two years, has seen a steady growth of interest in the social side of the convention and exhibition. More and more



Annual Banquet, American Mining Congress Coal Convention, Cincinnati, Ohio



Upper—Exhibit of Jeffrey Mfg. Co., winner of Honor Trophy. Irwin Foundry & Mine Car Co., U. S. Steel Corp. Subsidiaries, New Departure Mfg. Co., and Union Carbide and Carbon Corp., shown above, tied for second place.

delegates are bringing their wives, and this year special attention was given to their entertainment and comfort. Mrs. A. E. Bendelari, wife of the president of the Eagle-Picher Lead Company, a director of The American Mining Congress, and Mrs. Charles L. Harrison served as local hostesses. They were ably assisted by Mrs. Mark Egan, wife of the secretary of the Cincinnati Convention Bureau. Mrs. Bendelari entertained the 60 or more ladies at her beau-

tiful home with a luncheon; Mrs. Harrison opened her lovely estate for a tea; and Mrs. Wurlitzer (of the famous Cincinnati family) opened her estate for a garden picnic. Mrs. Julian D. Conover, wife of the secretary of the organization sponsoring the convention, served as official hostess for the Mining Congress and opened the ladies' entertainment features with a luncheon. Mrs. Charles L. Harrison lent herself graciously to all occasions, and a new "high" was reached

for the lighter side of the convention, as well as for the business side, which occupied the delegates fully from 9 a. m. to 6 p. m.

The local Cincinnati organization assisted to the best of its ability in making the meeting successful. Mark Egan, energetic and resourceful convention manager for the city, performed the miracle of helping to make Cincinnati mining-conscious, and the local golf clubs and

coal sales organizations did more than ever before to welcome the delegates.

It was a great convention and all those connected with it are entitled to the highest commendation for such an example of "organization."

The exposition was the largest, in actual floor area, ever presented by this group. One hundred and twenty-five companies participated, and practically every available space in both the north and south wings of Music Hall was filled. In addition to quantity and size, the quality of the exhibits surpassed those of previous years. In keeping with the upward trend in all matters connected with this event, much care was given to the beauty of the exhibits, and the machinery and equipment were presented in a new and more attractive manner. The Jeffrey Manufacturing Company, which occupied a very large proportion of South Hall, won the vote of the operators for the most interesting and attractive exhibit. Close runner-ups were (1) the United States Steel Corporation and subsidiaries, with their exceptionally beautiful and interesting display; (2) the New Departure Ball Bearing Company; (3) the Union Carbide and Carbon Corporation; and (4) the Irwin Car and Foundry Company.

Magnificent exhibits were presented in the heavy equipment class by the Goodman Manufacturing Company, the Sullivan Machinery Company, the Joy Manufacturing Company, the Bethlehem Steel Company, the Sanford-Day Company,

*Views  
of  
Exposition  
Halls.*



and the W. S. Tyler Company. Each exhibitor seemed to be enthusiastic about the exposition and gave serious thought and attention to displays. The result was an atmosphere of cheerfulness, enthusiasm and a definite feeling that this industry is headed in the right direction and certain of its destination.

The General Electric Company contributed the services of its nationally-known exposition expert, L. W. Shugg, who acted as honorary director of exhibits, and performed in his usual highly efficient manner. Certainly the exhibit offered an excellent example of what efficient cooperative effort may bring forth.

Among the new things presented for the consideration of the operators were the following:

A grease pump fitted with 400-lb. drum of lubricants, exhibited by the Alemite Sales Company; Brownie Model Hoists—Austin-Brownie mine gathering pump; Brownie Tubing Blower, exhibited by the Brown-Fayro Company; an operating model Deister-Overstrom Diagonal Deck Coal Washing Table, presented by the Deister Concentrator Company; complete line of rail bonds and bonding supplies, by the Electric Railway Improvement Company; the New Goodman Type 260 Track Loader, composed of five units; Universal Control Shortwall Machine; Shaker Conveyor Drive; Chain Conveyor



Assembly, presented by the **Goodman Manufacturing Company**; **Link-Belt Company** presented their model of a Link-Belt Simon Carves Washery; an operating model of the electric eye principle used in automatic and continuous discharge of rejects; and a model of their P. I. V. gear, variable speed transmission, and their motorized speed reducer; **Ohio Brass Company** presented Trolley and Feeder Wire Materials, Rail Bonds and Welders, Control and Safety Devices, Porcelain Insulators and Fittings, and Headlights; **Stephens-Adamson Manufacturing Company** showed their continuous flow conveyors, the air sand coal cleaner and various coal screening devices; **Timken Roller Bearing Company** presented seven full sized wheels and axles mounted on Timken Bearings. One of the mountings was loaned by the **Pocahontas Fuel Company**, being taken from a test car which had been run since June, 1931, on the original grease.

Small blowers used for ventilation of mine locomotives and cutting machine electric motors were featured by the **Robinson Ventilating Company**.

Different types of wire rope, insulated wire and wire screening, featured by **John A. Roebling's Sons Company**.

The Auto-matic Bottom-Dumping Trailer, used in stripping coal mines; the ball bearing car wheel and other equipment, exhibited by **Sanford-Day Iron Works, Inc.**

Protective clothing, including goggles, respirators, hard-boiled caps and hats, and Safety Shoes, presented by the **Safety First Supply Company**.

Cardox shell and methods, exhibited by **Safety Mining Company**.

MT-14 recorders and automatic check delivery device, shown by **Streeter-Amet Company**.

Various types of oils and greases for mine machinery and equipment, displayed by **Standard Oil Company (Indiana)**.

Complete line of lubricants for mining equipment and featuring Col-Kote which is applied to coal for a dust proofing medium, exhibited by **Sun Oil Company**.

A complete display of carbons, graphite and metal graphite brushes for electric motors, generators and rotary converters; welding carbons, electrodes, rods, and plates for electric and gas welding operations; etc., presented by the **National Carbon Company**.

**National Malleable & Steel Castings Company** exhibited their line of Naco cast steel equipment, including the steam shovel and drag line chains, mine car wheels, etc.

**New Departure Manufacturing Company** featured the "bouncing ball" exhibit of their bearings.

All types and sizes of the ball, roller and thrust bearings were displayed by the **Norma-Hoffmann Bearings Corporation**.

Everlast rail bonds, standard and special replacement parts for mining machines, locomotive gears, pinions, bronze bearings, etc., were presented by the **Penn Machine Company**.

**Hulburt Quality greases** for coal mine



Charles B. Officer, newly elected  
Chairman of the Manufacturers'  
Division

equipment, presented by the **Hulburt Oil & Grease Company**.

The **Joy Manufacturing Company** exhibited their new loader, the Joy Junior, built especially for operation in low seams.

**Koppers-Rheolaveur Company** exhibited their coal cleaning equipment, including the Koppers Birtley Deduster and Koppers Waring Dust Collector.

Safety shoes, rubber boots and placers were displayed by the **Lehigh Safety Shoe Company**.

Wire ropes for mining, exhibited by **A. Leschen & Sons Rope Company**.

**Lorain Steel Company** displayed their sectional conveyor and equipment.

**Macwhyte Company** displayed their wire ropes.

**McNally-Pittsburg Manufacturing Corporation** presented their Norton Automatic Washer and Norton Vertical Pick Breaker.

Miner draft and buffer carrier were exhibited by **W. H. Miner, Inc.**

**Myers-Whaley Company** exhibited their Low Type Mechanical Loaders.

**Mine Safety Appliances Company** presented their large line of safety equipment for mining, featuring the Comfort Respirator.

**Morrow Manufacturing Company** exhibited their five-track, five-grade screening unit.

**CJB Master Ball Bearings** and the **Ahlberg Ground Bearing process**, exhibited by **The Ahlberg Bearing Company**.

**American Brattice Cloth Company** displayed flexible tubing and brattice cloth for coal mine ventilation, also featured the patented demountable coupling used with flexible tubing for ventilation and a patented method of suspending the tube.

**U. S. Stainless Steel Alloys** for coal mining equipment, presented by the **American Sheet and Tin Plate Company**,

featuring special types of perforated **Stainless Steel Coal Screens**.

**American Steel & Wire Company** displayed their special mine ropes, tramways, rail bonds and accessories, electrical wires and cables, etc.

**Blasting Powder and Blasting Accessories** were shown by the **Atlas Powder Company**.

**Bethlehem Steel Company** presented their steel ties, switch stands, and their other various types of track equipment.

Mine ties, frogs and switches, and other rail and track equipment, presented by the **Carnegie Steel Company**.

A large line of drills—mounted electric, hand electric, portable electric and pneumatic—for mine car and maintenance works, presented by **Chicago Pneumatic Tool Company**.

**Cincinnati Mine Machinery Company** exhibited their coal cutting chain and equipment.

**Col-Rec**, a compound developed to render coal dustless and prevent freezing during winter weather, exhibited by the **Columbia Alkali Corporation**.

**E. I. duPont de Nemours & Co., Inc.**, presented instructive information on explosives, featuring **Nitramon**, a blasting agent for loading in drill holes of large diameter.

**Firestone Tire and Rubber Company** presented their new gum-dipped ground grip tires for strip mine truck haulage.

Trolley fittings and electrical transport equipment, exhibited by **Flood City Brass and Electric Company**.

Armature and field coils displayed by **National Electric Coil Company**.

**Utility Mine Equipment Company** exhibited their aluminum alloy rail benders, jack pipes and underground tools.

Two models of vibrating screens, together with woven wire screen cloth samples, exhibited by **The W. S. Tyler Company**.

**International Business Machines Company**, exhibited their recording equipment.

The application and results of wood preservatives for mine timber were effectively demonstrated by the **Wood Preserving Corporation**, including a sample of treated timber in 100 percent condition after 30 years of service.

**Duquesne Slag Products Company** exhibited their vibratory screen and classifier.

**Texaco oils and grease products**, especially featuring those lubricants designed for more profitable tonnage in coal mining, exhibited by the **Texas Company**.

**Toledo Printweigh Recorder**, providing positive printed weight records of loaded mine cars, and other scale equipment, exhibited by **Toledo Scale Company**.

**Hercules Powder Company** presented their extensive line of explosives for coal mining and blasting supplies.

Armature coils, insulations and field coils for coal mine locomotives and coal cutters, exhibited by the **Pennsylvania Electrical Repair Company**.

**Hendrick Manufacturing Company** exhibited their sizing and testing screens.

**Bucyrus-Erie Company** presented miniature models of their shovel for strip mining.

A completed line of gears, pinions and sprockets for various kinds of mining machines, locomotives and loaders, displayed by the **Tool Steel Gear and Pinion Company**.

Repair parts for coal cutting machines and locomotives, exhibited by **Bertrand P. Tracy Company**.

Tyson bearings and parts, exhibited by the **Tyson Roller Bearing Corporation**.

Complete line of lubricating products, presented by **Universal Lubricating Company**.

All-steel mine car, exhibited by the **Watt Car and Wheel Company**.

Steel mine ties, standard switch stands including rigid ground throws, spring ground throws and parallel safety switch stands, and other track equipment, displayed by the **West Virginia Rail Company**.

**Westinghouse Electric & Manufacturing Company** displayed their latest electrical developments.

**Phillips Mine & Mill Supply Company** displayed their line of mine cars, mine car wheels, perforated screen plates and other accessories.

**Portable Lamp & Equipment Company** presented their safety wearing apparel and lamps.

The **Perfection Cone Stove Sand Drier** for use at coal mines was exhibited by the **Princeton Foundry and Supply Company**.

A complete line of oils and greases for use in coal mining, presented by the **Pure Oil Company**.

The new improved **Stump Air-Flow** combined coal cleaner and deduster, shown by **Roberts & Schaefer Company**.

**Chance Sand Flotation Process** for cleaning bituminous coal, displayed by **Robins Conveying Belt Company**.

Overhead trolley line materials, combination feeder and trolley wire clamps for supporting both feeder and trolley wires from one insulated support, **Quick Break knife switch** especially designed for mining service, exhibited by **Electric Railway Equipment Company**.

**Exide Ironclad Batteries** and **Exide Flat Plate Batteries** in mine locomotive and other services, presented by **Electric Storage Battery Company**.

**Enterprise Wheel & Car Corporation** showed their four-axle, low type, large capacity mine car, **Enterprise Chilled and Annealed Wheels** adapted to use **Enterprise Solid roller bearings** and various types of tapered roller and ball bearings.

Ball bearing applications for mine equipment and general bearing replacement in the mines, presented by the **Fafnir Bearing Company**.

**General Electric Company** showed their line of electrical equipment especially adaptable for mining equipment and requirements.

**General Explosives Division of Ameri-**



*Honor Trophy awarded  
Jeffrey Mfg. Co.*

**can Cyanamid and Chemical Corporation** presented their blasting equipment.

Lubricants and lubricating devices for mining equipment, exhibited by the **Gulf Refining Company**.

The **Allen-Sherman-Hoff Company** displayed their **Hydroseal Sand Pump** for use in coal mines.

**Sullivan Machinery Company** presented their large line of mining equipment, featuring the **7-AU Universal Coal Machine**, saw blades and cutter bars, the **A-211 scraper loader hoist**; the **RHE-5 room hoists**; data on **Airdox**, etc.

**Jeffrey Manufacturing Company** presented their **35-BB shortwall coal cutter**; fans, showing the **4-ft. Aerovane** and the **8-ft. double stage Aerovane**; their extensive line of renewal parts; the **Conveyanscreen**; feeders, crushers; portable loaders, featuring the **Jeffrey Flextooth Crusher**; conveyors, featuring the **Jeffrey 61-W Room Conveyor**, the **61-1 Face Conveyor**, the **61-HO Face Conveyor**, the **61-AM Room Conveyor**; coal cutters; and automatic jigs, **Baum type** and **Diaphragm type**.

**General Steel Castings Corporation** exhibited a **7-ton car** with "**Commonwealth**" one-piece cast steel underframe, which has been in operation for past 20 months at **Derby No. 3 Mine**, **Stonega Coke and Coal Company**.

**Marlin-Rockwell Corporation** showed **ACF mine car wheels** equipped with **MRC double shielded lubri-seal ball bearings**.

**Tide Water Oil Company** exhibited complete line of lubricants scientifically engineered for industrial use, featuring the **Tide Water Green Cast Mine Greases**.

**Weir-Kilby Corporation** exhibited their line of equipment for mine track work, featuring the famous **Titan frog**.

**Hazard Wire Rope Company** exhibited their line of wire rope and fittings.

**American Telephone and Telegraph Company** displayed the **Bell System Teletypewriter Service**.

The following manufacturing companies also exhibited nationally known products which will be discussed in some detail in the **1935 Year Book on Coal Mine Mechanization**:

**Allis-Chalmers Mfg. Co.**  
**American Car & Foundry Co.**  
**American Cast Iron Pipe Co.**  
**Automatic Reclosing Circuit Breaker Co.**  
**Caterpillar Tractor Co.**  
**The Deming Co.**  
**Fairmont Machinery Co.**  
**Hockensmith Wheel & Mine Car Co.**  
**Irwin Foundry and Mine Car Co.**  
**Kanawha Manufacturing Co.**  
**Keystone Lubricating Co.**  
**Labour Co., Inc.**  
**Ladel Conveyor & Manufacturing Co.**  
**Mancha Storage Battery Locomotive Co.**  
**Marion Steam Shovel Co.**  
**McLanahan & Stone Corp.**  
**National Electric Coil Co.**  
**Nordberg Mfg. Co.**  
**Pittsburgh Knife & Forge Co.**  
**Frank Prox Co.**  
**Republic Steel Corp.**  
**Safety Equipment Service Co.**  
**S K F Industries, Inc.**  
**St. Louis Power Shovel Co.**  
**West Virginia and Penn Supply Co.**

**TWO** new network cables, one a leaded-type cable for use in ducts and the other a non-metallic cable for 600-volt service, have been made available by the **General Electric Company**.

In the leaded-type cable, a layer of **Glyptal treated cloth** covers the conductor and two layers of asbestos cover the **Glyptal cloth**. Both the cloth and the asbestos are treated with **Pyranol** and the whole is enclosed in a lead sheath.

The **General Electric Glyptal resin** used in this cable has a unique molecular structure that makes it the ideal base for insulating compounds that must be tough, resilient, elastic, tenacious, and not readily decomposed. **Pyranol** is a **General Electric liquid dielectric** which is non-inflammable, will not give off explosive gases, and possesses high dielectric strength.

The new leaded-type cable is the first in which the unusual mechanical and electrical properties of both **Glyptal cloth insulation** and **Pyranol** have been brought together to provide a network cable that is absolutely flame-proof and whose insulation will not give off explosive gases.

The new non-metallic cable for 600-volt service features a **Glyptal compound sheath** and a rubber compound insulation which is highly moisture-resistant. The properties of the **Glyptal sheath** make this cable suitable for use in oily or alkaline locations where protection against abrasion is not necessary; and because of the extremely low water-absorption factor of the rubber compound used for the insulation—which does not exceed 0.015 gram per inch—the new cable can be used in ducts or buried directly in the ground. When furnished with a treated-brain reinforcement, it can be used as a portable cable.

# PERSONALS

Howard N. Eavenson presented a paper upon "The Future of Bituminous Coal" at the recent convention of the Coal Division, The American Mining Congress.

R. C. Allen, Oglebay Norton and Company, Cleveland, spoke for the iron ore industry in the discussion of Dr. C. K. Leith's paper upon the purpose of the Planning Committee's recommendations for natural resources, at the special conference to discuss this subject at the Cincinnati convention of the Coal Division of The American Mining Congress.

Fred Searles, Jr., consulting geologist, has been elected a director of the Hecla Mining Company.

J. P. Williams, Jr., president, The Koppers Coal and Transportation Company, addressed the recent meeting of the U. S. Chamber of Commerce upon the future of the coal industry.

H. F. Bee has been appointed assistant Eastern Division manager of the Westinghouse E. & M. Co., with headquarters at Rockefeller Center, New York, N. Y.

H. A. Guess has been elected president of the Premier Gold Mining Co., Ltd.

Ralph M. Roosevelt, formerly vice president of Eagle-Picher Lead Company and president of The American Zinc Institute, has been elected president and director of Titanium Pigment Company. W. F. Meredith, formerly president of Titanium Pigment Company, was elected chairman of the board of that company.

Alfred C. Beatty has been awarded the gold medal of the Institute of Mining and Metallurgy in recognition of his distinguished service to the mining industry.

A. D. Carlton, The Cleveland Cliffs Iron Company, was recently elected president of the American Wholesale Coal Association, at its annual meeting at White Sulphur Springs, Va.

J. B. Putnam, Pickands Mather Company, Cleveland, was a recent Washington visitor.



*John Wellington Finch*

John Wellington Finch, director, United States Bureau of Mines, attended the recent convention and exposition of the American Mining Congress.

J. C. KempvanEe and Errol MacBoyle have returned to San Francisco, after flying across country to give special attention to legislative matters of interest to California metal producers.

Max H. Barber, district superintendent, The Cleveland Cliffs Iron Company, has been elected a director of the Cusi Mexicana Mining Company.

Charles B. Officer, vice president, Sullivan Machinery Company, of Chicago, was elected chairman of the Manufacturers Section of the Coal Division, of The American Mining Congress, at the annual meeting of that group, May 14, 1935.

Vice chairmen and officers elected at the recent meeting of the Manufacturers Section of the Coal Division, The American Mining Congress, include Bruce G. Shotton, Hendricks Mfg. Co.; William E. Goodman, Goodman Mfg. Co.; and E. A. Williford, National Carbon Co. New members of the board of governors include E. F. Carley, E. I. duPont de Nemours & Co., and H. G. Marsh, Carnegie Steel Company.

B. R. Gebhart, assistant to the president of Appalachian Coals, Inc., served, with distinction, as toastmaster at the recent banquet which was a feature of the Coal Convention and Exposition, The American Mining Congress.

**T**HE mining industry generally suffered a keen loss through the death of James C. Dick, veteran mining engineer, at his Salt Lake City home, May 1, after a lingering illness.

Mr. Dick was a prominent figure, nationally, during the war, assisting in valuation work on mines for the Income Tax Division of the Internal Revenue Department, and later was head of the Natural Resources Division, which was charged with valuing metal and coal mines, oil and gas wells, and timber lands for income tax purposes.

Born in Fallsbrook, Pa., in 1871, Mr. Dick completed his education in Pennsylvania at Lehigh University, from which he was graduated in 1895 as a civil engineer. Following his graduation he engaged in the coal mining business in Pittsburg, Kans., and four years later moved to Salt Lake City, and made extensive geological surveys in Utah. He later became chief engineer for the Utah Copper Company. Subsequently he was engaged in examination and consultation work on both metal and coal mines, throughout the West and in Mexico, and also managed several mining enterprises in Utah.

At the close of the war Mr. Dick returned to Salt Lake City, where he pursued his practice of consulting engineer, and in 1932 received an appointment as chief engineer for the Federal Barge Lines, operating on the Mississippi River, with headquarters at New Orleans. He served in this capacity until a few months ago, when he resigned because of ill health.

During his active career he made a deep impression on the mining industry, and his passing is keenly felt by his innumerable associates and friends. He is survived by his widow, Mathilde Dern Dick, sister of Secretary of War, George H. Dern, two children, Robert Dern Dick and Alice M. Dick, his mother, a brother, and four sisters.

The officers and directors of the Kanawha Manufacturing Company, of Charlestown, W. Va., announce with deep sorrow the death of its founder and president, Madison T. Davis, Jr., Wednesday, May 15, 1935.



# MINING EVENTS

## Coal

**T**HE coal industry has been involved in a decidedly intricate situation. Coal men have been scurrying hither and thither attending this meeting and that; this and that committee meeting, . . . all in the interest of a bigger and better coal industry. Literally thousands of coal men attended the annual Cincinnati convention and exposition of The American Mining Congress; and Washington was the mecca for the leaders from every field during the month. Certain groups sponsoring and certain groups opposing the passage of the Guffey Coal Control bill foregathered at their favorite Washington headquarters to do battle for and against this legislation. The legislation pot has kept at full boiling heat for months . . . the proposed extension of the National Industrial Recovery Act; the Wagner Labor bill; the Guffey bill; and 30-hour bills, all have demanded and received full attention from the industry.

On May 20, the National Conference of Bituminous Coal Producers voted unanimously to draft proposals for special legislation to govern the coal industry. Operators again foregathered on May 27, to evolve general principles for the proposed legislation. The Supreme Court decision, invalidating the NRA has put quite a different complexion upon all proposals, and at this writing the coal industry stands in the thick of the muddle. However, the Conference above referred to has presented a seven-point program which includes the following recommendations:

"That such (special) legislation shall provide for the stabilization of prices, including correlation of prices, and shall empower the commission, by appropriate rules and regulations, to administer such provisions in accordance with fair and reasonable standards for price stabilization set up in the act, and for the establishment of fair trade practices.

"That there must be a commission authorized and empowered to administer the provisions of such legislation.

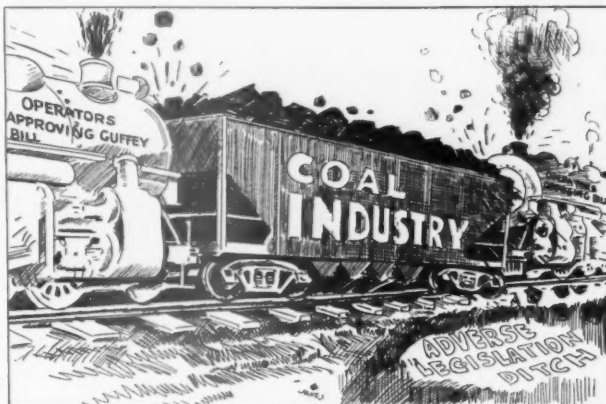
"That such commission shall investigate the necessity for the control of production and methods of control, shall hold hearings thereon, and shall report its conclusions to the Congress not later than January 6, 1935.

"That legislation, seeking the stabilization of the industry shall be limited in duration to a period of four years.

"That a committee of this conference be appointed by the chairman to draft

such amendments to the Guffey-Snyder bill as will carry out the desires of this conference as expressed in this report, which committee shall make such efforts as may be possible to secure the enactment of the same into law."

Members of the committee appointed to bring in recommendations were Charles O'Neill and Heath Clark, central Pennsylvania; J. D. A. Morrow and H. L. Findley, western Pennsylvania; E. H. Davis and William Emery, Jr., Ohio; C. H. Mead and John L. Steinbugler, smokeless; Irvin Davis, R. E. Taggart, and E. C. Mahan, southern high volatile; D. W. Buchanan, George W. Reed, and Hubert Howard, Illinois; William Taylor and Joseph Pursglove, West Virginia, and H. F. Marchant, the West.



Black Diamond

**A** COMMITTEE of the National Coal Association against the Guffey bill released the following statement:

"Following a meeting of the National Committee in Opposition to the Guffey Coal Monopoly Bill and for the Extension of a Strengthened National Industrial Recovery Act at the Hotel Washington on Thursday, May 16, those members in attendance, headed by Chairman H. R. Hawthorne, who acted as spokesman, called at the White House to assure President Roosevelt of their wholehearted support of his NRA two-year extension program.

"A formal statement left by the Committeemen for the President's perusal later, included a tabulation showing that every bituminous coal-producing state—with the exception of Illinois, Ohio and Pennsylvania (home of Senator Guffey)—is strongly opposed to the enactment of the Guffey bill. However, sentiment in Virginia and Michigan has not yet been obtained.

"The statement also informed the President that a majority of the Na-

tion's bituminous operators are for the NRA two-year extension because it has —(1) Reduced hours of labor; (2) Increased wages; (3) Brought about prices fair to both consumer and producer; (4) Improved standards of competitive practices and eliminated cut-throat competition; (5) Improved safety practices; (6) Improved living conditions of mine employees and of communities dependent upon the coal industry; (7) Reduced the waste of coal in mining; and (8) Improved the financial condition of the producers."

**T**HE first report of the season received from the Cleveland Ore and Coal Exchange concerning the dumpings of anthracite over lake docks, reports the Anthracite Institute, is most encouraging. The total of 67,941 net tons for the opening months to the end of April this year is almost 62 percent in excess of

those for the same period last year, due possibly to the more mild weather this season. The tonnage is over 9½ times for the same months in 1933.

By points of destination. Milwaukee and Duluth evince the largest tonnage gains, accounting together for 82 percent of the total increase. Milwaukee and Superior receive over two-thirds of the total shipments over the lake docks, followed by Duluth with an additional 14 percent. The greatest declines were recorded in the cases of Waukegan and Fort William.

**B**ITUMINOUS coal production in the United States for the week ended

May 18 was approximately 5,900,000 net tons. Production for the corresponding week: 1934, 6,237,000 tons; 1933, 5,093,000 tons. A report of the Bureau of Mines shows production of 4,994,000 tons for the week ended May 4, and 5,646,000 for the week ended May 11, 1935. Production calendar year to May 18: 1935, 147,018,000 tons; 1934, 144,833,000 tons.

**T**HE total production of anthracite (which includes colliery fuel) for the week ending May 11, as estimated by the United States Bureau of Mines, Department of the Interior, Washington, D. C., amounted to 935,000 net tons. This is an increase, as compared with production of the preceding week, of 26,000 net tons, or 2.9 percent. Production during the corresponding week in 1934 amounted to 1,088,000 tons.

**A**T A meeting of operators and others interested in safety, sponsored by the Alabama Mining Institute, held last Saturday morning in Birmingham, A. B. Aldridge, president, presiding, Dr. John W. Finch, director of the U. S. Bureau

# ESTIMATED PRODUCTION OF ANTHRACITE (Net Tons)

	1935		1934	
	Week	Daily Average	Week	Daily Average
April 27.....	1,089,000	181,500	1,485,000	247,500
May 4.....	909,000	151,500	1,361,000	226,800
May 11.....	935,000	155,800	1,088,000	181,300
Calendar year to May 11, 1935.....	19,517,000		Coal year to May 11, 1935.....	6,239,000
Corresponding period, 1934.....	25,266,000		Corresponding period, 1934.....	7,030,000
Decrease, 5,749,000 tons, or 22.8 percent.			Decrease, 791,000 tons, or 11.3 percent.	

of Mines, presented Joseph A. Holmes Certificates of Award to O. M. Cross, president of the Aetna Coal Co., to Carl McFarlin, vice president of the Black Diamond Coal Mining Co., and to Milton H. Fies, vice president of the DeBardeleben Coal Corp., for an outstanding safety accomplishment by each company. A number of operators and guests also made appropriate remarks.

**A**CCORDING to *Business Week*, 1.9 percent of all of the nation's workers now on relief come from the mining industries; 1.8 percent from agriculture; building trades, 11.5 percent; manufacturing, 29.1 percent; and in the service industries, including transportation, communication, trade, domestic and personal servants, public and professional services, 46.2 percent; and all others, 9.5 percent.

**W**ITH the object of increasing the flexibility of coal in washing plants, a number of new developments and improvements have been reported by the Anthracite Institute. Most interesting among these are the following:

(1) Placing the raw coal bunker in parallel with the washer box, instead of in series with it. Thus in operation the bunker is kept empty and the raw coal fed directly to the washer. In case of breakdowns in the latter, the full capacity of the bunker is available so that colliery operations need not be affected.

(2) Development of washing boxes capable of handling coal at various rates of feed, as is required where the above system is used.

(3) The Hirst patent stirrer which is supplied with prongs projecting downward above the jig and having a variable clearance. This device is said to speed up the process of separation and to increase the efficiency of washing under conditions of overload.

**D**URING the past 28 months, or since December 23, 1932, only four major disasters have occurred in the coal mines of the United States (a major disaster being one in which five or more lives are lost). This is at the rate of but one major coal mine disaster per seven months. In these four coal mine

disasters since December 23, 1934, but 42 lives were lost.

In the past 30 years, major coal mine disasters have occurred as follows:

1905.....	19	1921.....	5
1906.....	17	1922.....	14
1907.....	18	1923.....	11
1908.....	11	1924.....	10
1909.....	19	1925.....	14
1910.....	19	1926.....	16
1911.....	15	1927.....	9
1912.....	13	1928.....	14
1913.....	8	1929.....	7
1914.....	11	1930.....	12
1915.....	11	1931.....	6
1916.....	11	1932.....	6
1917.....	9	1933.....	1
1918.....	4	1934.....	2
1919.....	9		
1920.....	8	Total....	329

In the 30 years, 1905-34, inclusive, 329 major disasters have occurred in our coal mines, or an average of practically 11 per year, and for the first 10 years of that period the average was 15 per year. Our coal mines certainly have travelled far in the avoidance of major disasters when consideration is taken of the fact that in 1933 there was but one major coal mine disaster in the United States and but two in 1934 (and to May 1, 1935, but one in 1935). Moreover, in the 19 major disasters in the coal mines of the United States in 1905 (the first year of the 30-year period), there were 312 fatalities, while in the two major disasters in 1934 (the last year of the 30-year period) there were but 22 killed, and in the one major disaster in 1933 the fatalities totaled seven persons.

## Copper

**A**T THE seventeenth annual meeting of members of Virginia Coal Operators Association, held recently at Norton, Va., the following directors were elected for the ensuing year: J. J. Sellers, vice president, Virginia Iron, Coal and Coke Co., Roanoke, Va.; J. D. Rogers, vice president, Stonega Coke and Coal Co., Big Stone Gap, Va.; Lee Long, vice president, Clinchfield Coal Corp., Dante, Va.; R. S. Graham, vice president, Wise Coal and Coke Co., and president, Kemmerer Gem Coal Co., Norton, Va.;

W. H. Sienknecht, vice president, Blue Diamond Coal Co., Middlesboro, Ky.; J. L. Osler, general manager, Blackwood Coal and Coke Co., Blackwood, Va.; George J. Walker, general manager, Splash Dam Coal Corp., Lebanon, Va.; C. E. Ralston, general manager, Benedict Coal Corp., St. Charles, Va.; J. P. Shockey, general manager, Premier Red Ash Coal Co., Red Ash, Va. The directors elected the following officers: President, J. J. Sellers, Roanoke, Va.; vice president, J. L. Osler, Blackwood, Va.; secretary-treasurer, C. B. Neel, Norton, Va.

**"P**ROGRESS Toward Recovery in the Copper Industry" is the title of the pamphlet, which points out that in 1931 and the first half of 1932 no major industry in the United States suffered the ills of depression more severely than the copper-producing industry. The extent of drop in domestic consumption was, in itself, sufficient to throw the industry into disorder. Matters were made worse by the fact that foreign producers were gradually absorbing what little domestic business was left. The industry was in a state of unprecedented chaos.

"A natural step was taken by domestic producers in seeking tariff protection which would at least assure them of whatever business their home market might offer. An import tax of 4 cents per pound was imposed by Congress in 1932, but not before there was a decline in price to a new low record and an accumulation of stocks to an all-time peak.

"Because of this accumulation further adjustment toward order involved a definite control of production that could come about only through close cooperation among the members of the domestic industry.

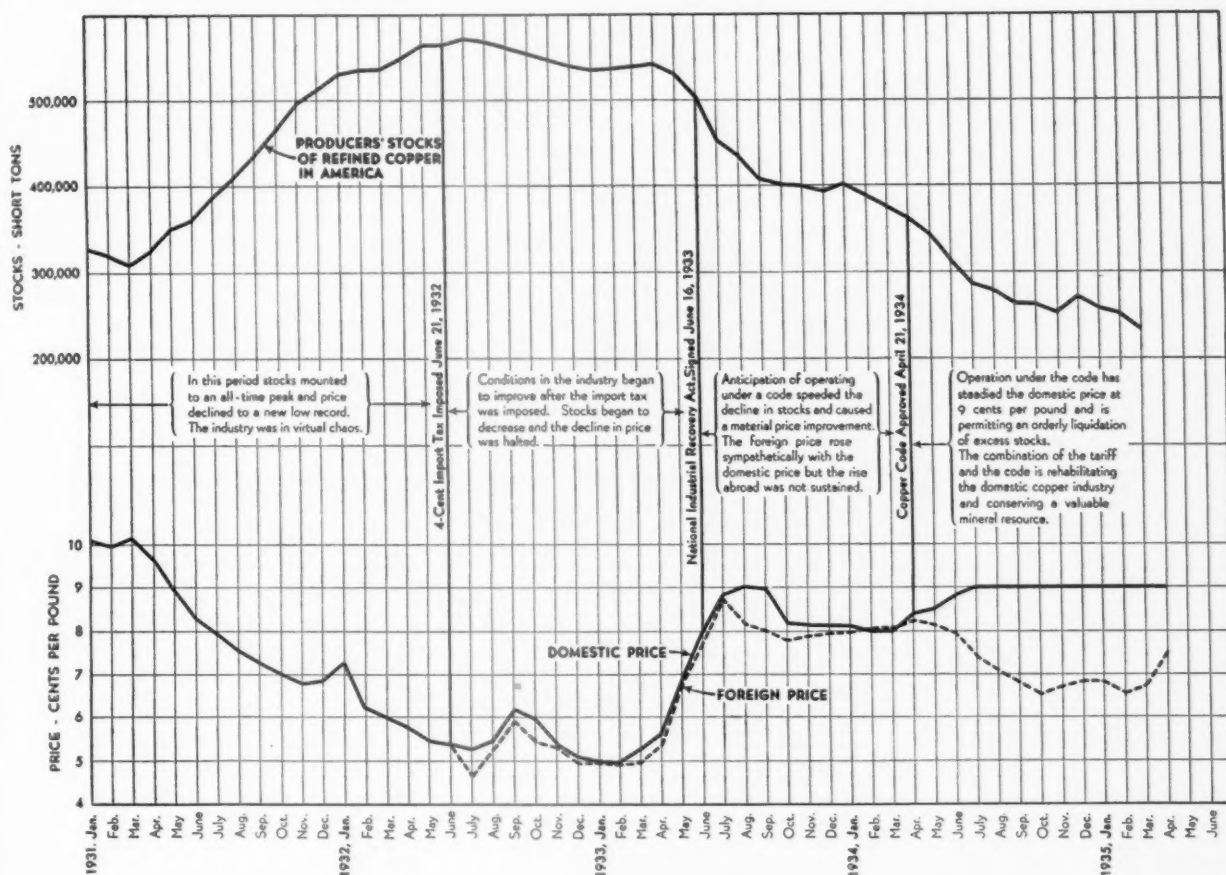
"The National Industrial Recovery Act made it possible to bring about the cooperation among domestic producers that has since gone far toward rehabilitating the industry, and if such co-operation is permitted to continue there is every reason to believe that the industry is on the road to permanent recovery."

"The attached chart indicates graphically and at a glance the progress toward recovery that has been made in the copper industry since June, 1932."

**E**XPECTATIONS of an advance in the export price of copper to 8.60 cents or better were voiced by F. H. Brownell, chairman of American Smelting & Refining Company.

Although he favors extension of the copper code, Mr. Brownell was of the opinion that it should not become permanent. He declared that it would be a serious handicap to producers in that it prevents initiative and planning among the producers. "It is a most deadening thing and is justified only in case of an emergency."

## PROGRESS TOWARD RECOVERY IN THE COPPER INDUSTRY



### Gold and Silver

**T**HE silver situation has puzzled the Congress, as well as the country at large. The Treasury called conferences with several prominent members of the silver group to discuss the situation. Subsequent conversations with some of the conferees indicated that the Treasury had no fixed policy. It is undoubted that the Treasury is concerned over the speculative rise of the world price of silver which it ascribed to silver speculators. That was one reason that it did not raise its domestic price from 77.57 cents to meet the 81-cent world price. The Treasury is now of the opinion that the world price fluctuation is due largely to speculation and not so much to the talked-about shortage of available metal. It is not too anxious to raise the price to the top monetary level of \$1.29, but on the other hand reliable information indicates that the next rise will be to the top figure to avoid the in-between juggling that occurs due to speculator anticipations.

It is understood that Mexico is not opposed to the rise in price of silver. The conference held with Mexican representatives was largely for the pur-

pose of charting a course. Mexico was anxious to learn how far the United States is going so that it can plan its monetary program accordingly. The Mexican representatives were promised a respite in order to make effective certain changes in the silver content of the peso which would prove embarrassing should the world price of the metal reach \$1.29. There is some reason to believe that the final rise in price may follow shortly after Mexico and other Latin-American countries affected make provisions for the higher silver price. At least two members of the important silver group in the Senate (both of whom urged the top monetary price for silver) are of the definite opinion that \$1.29 silver will be here shortly.

**A**PPROXIMATELY 157,000,000 man-hours of labor—equivalent to a full year's work for more than 100,000 men—were required last year to mine the iron ore, coal and limestone, to convert the coal into coke and finally to produce pig iron.

Manufacture of one ton of pig-iron, it is estimated, requires about four tons of air, 1 2-3 tons of iron ore, almost one

ton of coke, one-third of a ton of limestone, and about one-quarter of a ton of scrap, mill scale and cinder.

To transport 49,000,000 tons of the raw materials at one time would require 10,000 trains, each one mile long. A motorist halted at a grade crossing would have to wait more than eight days and nights for the trains to pass at 50 miles per hour.

The total tonnage would form a pile estimated at one city block square at its base and more than half a mile high, or, if spread out to a depth of one foot, would cover an area the size of Manhattan Island.

### Iron and Steel

**T**HE International Union of Mine, Mill & Smelter Workers, which is affiliated with the American Federation of Labor, has obtained a foothold in the Lake Superior iron ore district during the past winter, reports *Skilling's Review*. Locals at several points in Michigan seem to be taking the lead in steps to force demands upon the iron mining companies. The demands of the Michigan locals are all much the same, and



the following covers the list quite thoroughly:

The demands upon the iron mining companies are as follows:

- 1—Seven hours from collar to collar of shaft.
- 2—Increase of 50 percent wages.
- 3—Recognition of the local union.
- 4—Abolition of contract system.
- 5—Seniority rights to be recognized at individual mines.
- 6—Two men in each working place.
- 7—Two men on cage hoist platform at all times.
- 8—Two men in pump house when mine is not working.
- 9—Five days per week.

The representatives of the iron mining companies have nothing to say. Millions of tons of iron ore have been mined for no other immediate purpose than to provide employment. Work has at all times been distributed in such manner as to provide wages when most needed. The iron mining industry during the past few years has suffered along with all other industry. The iron mining companies have always dealt direct with their employees.

#### NOT SO EAGER TO VOTE STRIKE

It takes a two-thirds vote of a union mine local to authorize a strike. The Iron River, Mich., local lost by five votes to authorize a strike. Unions at Crystal Falls, Gaastra and other Michigan points have taken strike votes. It would seem that while mine workers have been induced to join the union that they are not as ready to declare strikes as possibly the organizers imagined. The union has no good ground for complaint concerning wages and working conditions in the Lake Superior iron mining district.

**I**F ONE man owned the entire American steel industry, his five-billion dollar investment would not have earned him a fair return since 1930, according to the American Iron and Steel Institute.

Furthermore, over the past ten years he would have received 37.5 percent less income from such an investment than if he had deposited a like sum of money in an ordinary bank savings account.

A compilation of the earnings records of companies comprising a large part of the ingot capacity of the steel industry shows that the weighted average of earnings on capitalization has been only 2.5 percent after all charges but before dividends, during the period from 1925 through 1934, a period which includes several of the best years the steel industry has ever experienced.

That rate of return compares with the average annual interest rate of 4 percent paid by banks throughout the country on savings accounts over the same period.

Even in 1929, the year in which more steel was produced than in any other

#### LIVING FROM HAND TO MOUTH



—Washington Daily News

year, the steel industry earned only 9.2 percent on its capitalization, while in only three of the ten years covered by the compilation did earnings exceed 5 percent. In contrast are the aggregate losses of the industry from 1931 through 1934.

By drawing against the earnings of the profitable years, the steel industry has been able to continue operations with few receiverships during recent years in which payrolls, depreciation, taxes and various other expenses have exceeded income by an amount estimated at \$285,000,000. The approximate annual return on the invested savings of stockholders of the steel industry, who actually number 492,000 men and women rather than a single hypothetical individual, is shown in the following table for each of the years 1925 to 1934:

Year—	% earned a Capitalization
1925 .....	4.3
1926 .....	5.4
1927 .....	4.0
1928 .....	5.2
1929 .....	9.2
1930 .....	3.8
1931 .....	deficit 0.4
1932 .....	deficit 3.6
1933 .....	deficit 1.7
1934 .....	deficit 0.4
Weighted average .....	2.5%

#### Lead and Zinc

**T**HE output of rolled zinc (sheet zinc, boiler plate and strip zinc) in the United States in 1934 was 40,916 tons, valued at \$6,201,000, compared with 41,261 tons, valued at \$6,055,000, in 1933. Thus, the production was 1 percent lower and the value 2 percent higher in 1934 than in 1933. In addition to the quantities given, scrap originating in fabricating plants operated in conjunction with zinc-rolling mills was rerolled and

production therefrom amounted to 9,333 tons in 1934, and 6,342 tons in 1933.

Zinc used in rolling was made up of the following grades: Brass special, 47 percent; high-grade spelter, 18 percent; prime western and selected, 13 percent each; intermediate, 5 percent; and electrolytic, 4 percent. In 1933 brass special and best selected zinc used in rolling were reported together as 56 percent of the total; prime western, 16 percent; high-grade spelter, 15 percent; intermediate, 10 percent; and electrolytic, 3 percent.

**T**RADe journals and other agencies report that both lead and zinc are looking up.

"The lead and zinc industries have been building up on more stable foundations. Their statistical positions have been placed in better order. Slab zinc stocks have been reduced substantially for the past four months and now are down to within about 30,000 tons of the total at the end of 1929, or less than a month's shipments. Refined lead stocks are about 12,000 tons below their depression peak.

"All factors point to higher prices for both of these necessary metals which will permit producers to break even financially."

**T**HE manufacture of zinc in the United States in 1934 and 1933 is given in the following table, in tons of 2,000 lbs.:

	1933	1934
Galvanizing .....	148,000	152,000
Brass-making .....	94,000	98,000
Rolled zinc .....	4,300	40,900
Die castings .....	26,000	32,000
Other purposes .....	41,000	37,000
Totals .....	350,300	359,900

The above totals naturally correlate with the total delivery of slab zinc, regardless of origin as virgin, or from re-distilling, or from remelting.

The increase in the use of zinc for galvanizing in 1934 occurred entirely under the head of sheet galvanizing, the consumption in all other branches being a little less in 1934 than in 1933. Per 2,000 lbs. of galvanized sheet produced the melting of zinc was 187 lbs. in 1934 vs. 188.5 in 1933.

The increase in the use of zinc for brass-making was again associated largely with the increased manufacture of automobiles and their parts. Substantially the same may be said in respect of the increase in the use of zinc for die castings, whereof approximately 50 percent was again ascribable to automobile manufacture. Our accounting for the use of zinc under the head of die casting may possibly be a little too low.

In the form of brass, rolled zinc and die castings the manufacture of motor vehicles in the United States in 1934 absorbed about 41,000 tons of metal.

Under the head of other uses there was a diminished consumption for the manufacture of oxide and an increase in the use for slush castings. Other consumptions under this head are poured castings and lead desilverization.

The use of zinc in the manufacture of primary batteries was as follows:

	1933	1934
Rolled zinc:		
For dry cells .....	10,842	12,500
For wet batteries....	23	16
Total .....	10,865	12,516
Cast zinc:		
For wet batteries....	1,823	1,797
Total zinc .....	12,688	14,313

For the manufacture of brake lining 197 tons of zinc wire were used in 1934 compared with 350 tons in 1933.—*American Bureau of Metal Statistics.*

**W**ITH a general strike on at both the mines in the Picher camp and at the lead smelters in Galena, Kans., and the Joplin plants of the Eagle-Picher Lead Company, the markets for concentrates have been badly disorganized and very little effort has been made to secure shipment. The price levels have been retained at \$25 for flotation and \$26 for mill grades so far as the general offerings for zinc concentrates were concerned, but very little tonnage was actually sold.

The general strike at the mines affected practically every mine in the Picher camp. Some of the smaller mines in the Missouri portion of the field were untouched and continued operation but their output is small. Since the operators have been anxious to curtail output in many quarters, the strike shutdown is not taken very seriously over the district by the operators themselves. Many of them would like to stay down from 30 to 60 days and so far as operators are concerned it is not likely that any early effort will be made to settle the strike.

The strike is likely to be a very serious one for the miners, as they are trying to get on relief rolls immediately but none of the three states involved can very well

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A List of Books and other Sources of Information regarding Coal and Coal Products, has been compiled by F. R. Wadleigh, well known coal statistician and authority. The book lists over four hundred references, some going back to the 15th century, one publication being issued in 1556. Copies of this valuable publication may be had for \$1.00 a copy, by addressing Mr. Wadleigh, in care of The American Society for Testing Materials, The Franklin Institute, or, The American Mining Congress.

#### Production, imports and exports, of rolled zinc in the United States, 1933-34

	1933			1934		
	Short tons	Total	Average per pound	Short tons	Total	Average per pound
Sheet zinc not over 0.1-in. thick.	\$12,810	\$2,115,000	\$0.083	13,082	\$2,338,000	\$0.089
Boiler plate and sheets over 0.1 in. thick.....	469	72,000	.077	817	118,000	.072
Strip and ribbon zinc.....	27,982	3,868,000	.069	27,017	3,745,000	.069
Total zinc rolled .....	41,261	6,055,000	.073	40,916	6,201,000	.076
Imports .....	46	6,700	....	55	7,000	....
Exports .....	3,189	468,000	.073	3,462	569,000	.082

<sup>1</sup>Figures represent net production. In addition, 6,342 tons in 1933 and 9,333 tons in 1934 were rerolled from scrap originating in fabricating plants operated in connection with zinc-rolling mills.

By H. M. Meyer, Division of Mineral Statistics, Bureau of Mines.  
O. E. Kiessling, Chief Economist.

#### Tri-State Zinc and Lead Ore Producers' Association

	—Zinc Concentrates—			—Lead Concentrates—		
	This Week	Last Week	Year Ago	This Week	Last Week	Year Ago
Total Stocks (Sold and unsold)...	23,454	23,501	14,700	17,004	17,004	12,750
Net Reserve Stock .....	23,153	23,200	13,746	17,004	17,059	12,491
Production (*) .....	133	6,504	7,883	31	504	883
Shipments .....	180	6,805	6,070	31	421	896
Sales reported .....	180	5,819	5,457	86	366	980
(*) Including Tailing Mill						
Production .....	24	1,685	1,886			
Base price—Joplin .....	\$26.00	\$26.00	\$29.00	\$36.00	\$36.00	\$42.50
Zinc, E. St. L.—Lead, St. L.....	4.230c	4.200c	4.350c	3.700c	3.600c	4.030c

#### Mill Statistics

	This Week	Last Week	Year Ago
Mine mills operated 32 hours or more.....	0	20	29
Mine mills operated less than 32 hours.....	0	6	2
Tailing mills operated 96 hours or more .....	0	12	22
Tailing mills operated less than 96 hours.....	0	8	1
Total mills which produced more than 25 tons during week...	0	46	54
Mills which produced less than 25 tons during week.....	4	5	9
Total number of mills operated during week.....	4	51	63

Mine Mills Operated This Week: Byrd; Denny; Playter.  
Tailing Mills Operated This Week: Bailey.

BULLETIN FOR WEEK ENDING MAY 18, 1935  
(Dry Tons of 2,000 lbs.)

add so many men to their already heavy burden. Missouri has already notified the strikers in Jasper County that no funds are available for the month of May for taking on any extra load whatever. No public announcement has yet been made from Oklahoma and Kansas. Counting both miners and smelter workers there are about 3,500 to 4,000 men involved in the three states covering the mining and smelting areas. The strike was called by the Mine and Smelter Workers Union, a newly organized group. The workers' demands consist of recognition of the union under the NRA labor section as applied to the zinc and lead code, establishing differentials from the minimum wage scale of the code, and general betterment of working conditions. So far there has been no conference between the operators and the

strikers.—(Reprinted from *The American Metal Market.*)

**E. V. GENT**, formerly manager of the Zinc Export Association, has been selected as secretary of the American Zinc Institute.

Mr. Gent assumed the office held for a number of years by Julian D. Conover, who resigned from the institute at the end of last year to become secretary of the American Mining Congress in Washington. Mr. Gent brings to his new office a wide experience in the zinc industry gained through his secretaryship of the Zinc Export Association from December, 1925, to the end of last year when the organization was dissolved. Since January, 1930, he has been affiliated also with Carbon Black Export, Inc., 500 Fifth Avenue, New York, in a managerial capacity.

## BUREAU OF MINES' Activities To Be Expanded During Coming Year

**A**N APPROPRIATION of \$1,970,311 to the Bureau of Mines for the new fiscal year beginning July 1 is made in the Interior Department supply bill which has been signed by the President. This amount includes a net increase of approximately \$600,000, granted in response to numerous appeals from the mining industry urging that the Bureau be given sufficient funds to resume many important services that had been discontinued or curtailed because of cuts in appropriations during past years, and to undertake important new work that lack of funds had hitherto prevented.

The additional funds will permit an expansion of the economic and statistical studies of the Bureau so as to give the mineral industry a complete picture of mineral resources, production, consumption, and trade conditions, as well as factors affecting the movement and utilization of mineral commodities. This information will also be extremely valuable to Congressional committees, permanent agencies of the Federal Government, and emergency or recovery organizations.

Investigations of health hazards in the mineral industries, which were suspended two years ago, will be resumed. This work includes studies of harmful dusts and gases and other causes of occupational diseases contracted by miners. Instruction in safety and first aid, particularly at small-scale mining operations, can be extended. Such operations have attracted many inexperienced and unemployed men and as a rule do not provide means of avoiding dangers that may result in accident or ill health. Training in first aid is one of the most effective ways of education in safety.

The Bureau of Mines has determined that certain types of explosives, which it calls "permissible," are comparatively safe when properly used, even in gaseous or dusty coal mines. Further studies on methods of handling, storage, and use will be undertaken to make these "permissible" explosives even safer and more efficient. Fundamental data regarding flame temperatures and explosion pressures, as well as the movement of flames, will be sought as a means to a better understanding of the propagation of explosions in mines, which in turn will lead to safeguarding of human life and property. The data will also be of value in

studying the action of fuel in internal-combustion engines.

The Bureau will be able to increase its activities at the Experimental Mine, Bruceton, Pa., in studying mine ventilation, roof support, and explosions of gas-air mixtures or mixtures of coal dust and air.

Even the 200,000 analyses of coal made by the Bureau of Mines are inadequate to meet the demand, stimulated by the NRA codes, for data on comparative fuel values of delivered coal and for a suitable classification of the different American coals. Modern industry also needs to know how coal disintegrates on handling or storage, whether it cakes in the fuel bed, how easily it can be pulverized, whether it is suitable for making gas or coke, and what chemicals can be derived from it. A portion of the increased funds will be expended for research on these important problems.

The Bureau will expand its studies on low-temperature carbonization of coal in the effort to find a solution for the smokeless-fuel problem and thus prevent waste of fuel value in the soot and tar composing the smoke and will avoid damage to buildings, clothing, etc.; to accelerate the development by the industry of commercial carbonizing processes; and to determine the composition of by-product oils and tars and develop commercial uses for them. Apparatus on a small, laboratory scale will be constructed to study the extraction of motor fuel from coal and lignite as one step in research looking forward to the time when known reserves of petroleum will be exhausted and when a major oil-from-coal industry will be a national necessity.

Among the new studies to be initiated will be electro-metallurgical research to develop possible uses for surplus power at Boulder Dam, Muscle Shoals, and other Federal projects, by the exploitation of adjacent mineral deposits and the production of aluminum, magnesium, and other metals by electrolytic or electro-thermic methods.

During the past few years there has been an insistent demand for ore-testing services by the Bureau. This work can now be done, and in a field that will not compete with consulting engineers or commercial laboratories, by studies leading to standardization of testing methods of interest to the mining industry, by routine analyses and tests incident to investigations of the Bureau of Mines or other Government agencies, and by chemical and microscopic analyses of samples, representative of a mining district, with recommendations as to ore-dressing practices.

The Bureau will undertake a survey of the more important mining districts

primarily to determine resources and productive capacities, but, incidentally, where needed, to assist small operators who cannot afford to employ competent engineers in the solution of their technical problems, and thus prevent economic waste resulting from ill-advised expenditures of time and money by inexperienced persons attempting small-scale mining operations.

Factual information with respect to production, storage, and utilization of petroleum and natural gas is in greater need by the Government and the industry today than ever before. Reserves of these natural resources are limited and substitutes can be had only at high cost, so it is important that petroleum shall be produced without waste, as needed, and that as little oil as possible shall be left underground beyond recovery. To make the best production, exact engineering information is needed concerning conditions in underground reservoirs and wells, and as to the physical laws governing the flow of oil. Also, new plans of proration, production control, and unit operation of newly developed structures are full of technical difficulties. Adequate studies to obtain the needed engineering information can be made only by an experienced and impartial organization such as the Bureau of Mines. The additional funds for the coming year will enable the Bureau to resume its activities in this field where its studies in the past have invariably been reflected in reduced costs, increased safety and efficiency, and conservation of resources.

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**A** RESEARCH fellowship in ore dressing or metallurgy is open at the Missouri School of Mines and Metallurgy, Rolla, Mo., in cooperation with the United States Bureau of Mines. The candidate must have obtained his master's degree and be prepared to pursue work for a doctorate. He must present an acceptable problem. The stipend is \$800 for 10 months.

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**T**HE quantity of magnesium ingot sold or used in 1934 was 4,249,838 pounds, an increase of 196 percent over 1933. The entire domestic output of primary magnesium was obtained from magnesium chloride recovered as a joint product of the salt wells of The Dow Chemical Company, near Midland, Mich.

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**D**URING 1934 production of 100,973 short tons of crude magnesite was reported from three mines in California and one in Washington. This was a decrease of 6.7 percent from the quantity mined in 1933 (108,187 tons), but it still showed a substantial increase over 1932 (38,462 tons).

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*NOTE: The National Committee on Rehabilitation, the U. S. Bureau of Mines, American Mining Congress, sponsor; Eugene McAuliffe, chairman, through its successful efforts has enabled the Bureau to make this announcement.*



# NEWS OF MANUFACTURERS

**P**REPARING Coal of Higher B.t.u. Value at the Lowest Cost Per Ton, by Applying Scientific Preparation Methods," is the sub-title of a 32-page Coal Preparation Book No. 1521 released by Link-Belt Company, 300 W. Pershing Road, Chicago. The major part of the new book is devoted to the Simon-Carves washing system, of which it is stated there are 32 units in service in America and 300 throughout the coal fields of the world, all installed since 1903.

The Simon-Carves system is described in detail, and numerous installation views are included. Among the features incorporated in the system within the past year, and illustrated and described in the book, is an adaptation of the principle of the photo-electric relay, or "Electric Eye," for effecting automatic discharge of the refuse.

The company will forward a copy of new book to any interested reader, upon request.

**R**OBINS CONVEYING BELT COMPANY announces a new, light, Mead-Morrison rehandling grab bucket, known as Type RH, developed and put on the market by the Mead-Morrison Division of the Robins Conveying Belt Company.

This new bucket is said to be exceptional in its relation of capacity to weight.

**A** VERY attractive presentation of ALLIS-CHALMERS equipment for coal mining and preparation plants is made in their new Bulletin No. 153. Copies will be gladly furnished on request direct to the company at Milwaukee, Wis.

**A** NEW LINE of double suction, single-stage split case centrifugal pumps which, the makers state, combine a number of unusual features, has just been announced by the Gardner-Denver Company, Quincy, Ill.

This new line of high efficiency pumps is adaptable to practically any class of service, and is particularly recommended for general water supply in municipalities, industrial establishments, office buildings, and similar installations, due to their compactness and high efficiency.

The pumps are designed for any type of drive, including flat belt, V-belt, direct connected, gas or diesel engine, although the usual drive is connected directly to an electric motor.

**S**ULLIVAN MACHINERY CO., announce the removal of their general offices from the Wrigley Building, to the Bell Building, 307 N. Michigan Avenue, Chicago, Ill.

**T**HOROUGHGOING, safety precautions today are observed to be of vital importance to every sound thinking and far-sighted executive. In addition to ordinary preventative and protective measures, however, a distinct need for adequate "Point of Danger" sign exists, to warn workmen at the point of danger itself.

The Mine Safety Appliances Company, Meade, Thomas, and Braddock Avenues, Pittsburgh, Pa., has prepared an illustrated and informative bulletin describing their complete line of safety signs.

A copy of this publication, just off the press, may be secured without charge by addressing the company direct.

**N**EW distribution transformers with self-contained lightning protection by means of true valve-type lightning arresters, with interiors of new electrical design, and having new mechanical structures, new clamp-terminal bushings, and new tank finishes are now available from the General Electric Company.

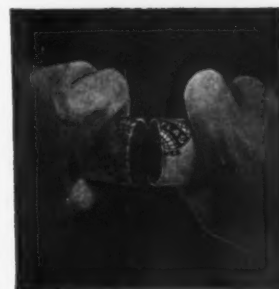
In this new transformer, a valve-type



Thyrite lightning arrester is combined with a removable pocket-type high-voltage bushing and installed as part of the transformer, being sealed in that portion of the bushing which is external to the tank. This construction retains all the protection of the true valve-type arresters, places the arrester between the cut-out and the transformer, and clears up the pole installation.

**T**HE new, exceptionally sturdy, low-priced single-deck screen of the popular "Aero-Vibe" design is announced by Allis-Chalmers Mfg. Co., Milwaukee, Wis., in all sizes from 1½ by 3 to 5 by 10 ft. These screens "float in the air" suspended by cables and springs, vibrated by adjustable counter-weighted wheels. They will handle medium to fine size commercial materials, either wet or dry in moderate tonnages.

**T**HE ATLAS POWDER COMPANY, of Wilmington, Del., which brought worthwhile savings to the users of old style pellet and black powder by the introduction of Blakstix, announces that by reason of a unique discovery this stick powder is now available in a new cartridge that is easily and accurately broken by hand, to obtain quarters, halves, or three-quarters. No cutting is



needed, unwrapping is unnecessary, each piece remains in its original wrapper and there is no loose paper to be scattered about.

**K**OPPERS-RHEOLAVEUR COMPANY, Pittsburgh, Pa., will shortly begin work on a new cleaning plant at the properties of the Northern Illinois Coal Corporation.

This cleaning plant will be installed adjacent to their present tipple at Mine No. 10 near Wilmington, Ill., and will have a capacity for 435 tons per hour of 3-in. by 0 coal which will include the crushed pickings from the plus 3-in. sizes. The equipment installed will include a 2-laundry Rheo course coal plant and a fine coal Rheo unit for recleaning ¾-in. by 0 coal. The flow sheet will be very similar to the Fidelity installation except that due to the lack of intermediate gravity material no crushing of bone will be done over the coarse coal rewash launder. Two AR-4 Carpenter dryers will be installed and heat dryers will be included to dry the ¾-in. by 5/16-in. and 5/16-in. by 48-mesh sizes of washed coal. Screening and mixing facilities will be provided to produce 3-in. by 2-in., 2-in. by 1½-in., 1½-in. by ¾-in., ¾-in. by 5/16-in., and 5/16-in. by 48-mesh, and any combinations of these sizes which can be loaded at the washing plant or returned to the tipple for mixing with the plus 3-in. sizes. Storage bins are provided for ¾-in. by 5/16-in. and 5/16-in. by 48-mesh. Two storage bins are provided for the loading of trucks. A rotary type car dumper for open top railroad cars to handle incoming raw coal at the tipple, will also be installed.

The plant is scheduled for operation by November 1, 1935.

## || National Mineral Policy

(Concluded from page 14)

some measure of equality of economic opportunity among the nations. France, the International Chamber of Commerce, and others have suggested some such control.

I merely mention these questions as pertinent to the formulation of any national policy. They are highly controversial, there are yet no adequate data for their solution, and to many they seem to lie in the field of abstract discussion of a future Utopia. Nevertheless, they are coming forward in many parts of the world in response to the pressure of acute local situations, they are being proposed in some cases by hard-headed people, and it seems likely that sooner or later we shall have to give consideration to them.

### CONCLUSION

These are some of the elements of a national mineral policy which have been presented in preliminary and tentative form in the report of the Planning Committee for Mineral Policy to the President. In a later report we hope to present a more adequate statement, but there will still be important gaps, simply because it has not been thought out. I share with most people the feeling that much of the present orgy of planning is futile, that there is no panacea for our troubles, that any step to bring political government into the industry should be very tentative and cautious, and that the trend of our mineral industries in the future, as in the past, will be determined by many circumstances and conditions which we do not now foresee. I am also fully convinced that the brains simply do not exist which are competent to solve all the shifting variables in the problem and produce a fool-proof plan broad enough to cover all future contingencies.

On the other hand, what is the alternative? I imagine there are few of us who are contented with a purely defensive, defeatist, or drifting attitude. Circumstances are forcing decisions on important elements of planning, and we must do the best we can with these immediate and special questions. The present effort to formulate a policy is directed toward development of a broader perspective, in the hope that this may improve to some extent our decisions on the many special questions now pressing for solutions. Whether we like it or not, the chances of return to a policy of complete *laissez faire*, especially of return to entirely unrestricted competition for at least some of our minerals, including coal and oil, seem remote. We should not blind ourselves to the recent rapid spread of nationalization of mineral resources and other natural resources in nearly all parts of the world, regardless of form of government, with hardly a single reverse movement. In our own country the trend has been in the same direction, though not so obvious and rapid. The Leasing Act and

its extensions, the Oil Administration, and NRA codes, and much state legislation are bringing the question squarely before us. The mineral industries based on exhaustible natural resources are unquestionably facing new social and political problems of vital interest to their future. Enlightened self-interest, as well as national welfare, calls for a more concerted effort to understand and solve these problems than has been necessary during the younger and exploitive stages of the mineral industries.

**T**HE tungsten mining industry was substantially revived in 1934, the quantity of domestic ore shipped being by far the largest since 1918, as announced by Frank L. Hess, principal mineralogist, and H. W. Davis, mineral statistics division, O. E. Kiessling, Chief Economist.

In 1934, 2,049 short tons of concentrated tungsten ore (reduced to an equivalent of 60 percent WO<sub>3</sub>) produced in the United States, were sold, compared with 895 short tons in 1933. The average value per unit of the tungsten concentrates sold increased from \$9.58 in 1933 to \$14.57 in 1934. The price for 1934 is the highest average peace-time price. Shipments of tungsten concentrates were made from Arizona, California, Colorado, Idaho, Nevada, New Mexico and Washington in 1934.

The shipments of tungsten concentrates in the United States during the past five years are shown in the following table:

### CONCENTRATED TUNGSTEN ORES

(Reduced to an equivalent of 60 percent WO<sub>3</sub>) produced in the United States, sold in 1930-34, and average price per unit

Year	Short tons	Value	Average price per unit
1930	702	\$509,000	\$12.09
1931	1,404	928,000	11.02
1932	396	218,394	9.20
1933	895	514,234	9.58
1934	2,049	1,791,316	14.57

Detailed statistics and a summary of developments in the tungsten industry during 1934 will appear in the Minerals Yearbook 1935, to be issued in August.

**T**HE Dow Chemical Company of Midland, Michigan, and the Cleveland-Cliffs Iron Company of Cleveland, announce that they have joined in organizing the Cliffs-Dow Chemical Company. The scope of the new company will be to manufacture chemicals derived from wood, a field in which both companies have been experimenting and carrying on research work. The location at Mar-

quette is considered a very favorable site as it is adjacent to the large timber holdings of The Cleveland-Cliffs Iron Co.

The initial meeting of the Board of Directors was held yesterday, the board elected by the stockholders consisting of Messrs. Willard Dow, M. E. Putnam, E. W. Bennett, L. I. Doan, and C. J. Strosacker representing the Dow Chemical Company; and Wm. G. Mather, E. B. Greene, A. C. Brown, and V. P. Geffine, representing the Cleveland-Cliffs Iron Company; and Mr. E. T. Olson, present manager of the Cleveland-Cliffs Iron Company chemical plant. The officers of the Cliffs-Dow Chemical Company are as follows: Willard Dow, president; E. B. Greene, vice president; E. W. Bennett, treasurer; V. P. Geffine, secretary and E. T. Olson, general manager.

## || Safety in Mechanized Mining

(Concluded from page 24)

Safety plays no favorites—every one makes his proper contribution and doing his part receives his full due in return. A person who is not willing to become a part of the safety campaign is not worthy of and should not expect to be considered as necessary to the company, for to neglect your safety duty is to jeopardize the lives and possibly the health of those around you whose efforts are striving to protect you in safety, health and the position which you hold.

**I**F ALL the raw materials consumed during 1934 in the manufacture of pig iron had been hauled by the railroads at one time, 1,000,000 freight cars—half of the total number of all types of freight cars in the United States—would have been loaded to capacity, the American Iron and Steel Institute has estimated.

Nearly 49,000,000 gross tons of iron ore, coke, limestone, mill scale, cinder and scrap were charged into pig iron producing blast furnaces last year. More than 26,000,000 tons of this total consisted of ore; almost 14,000,000 tons were coke; over 5,500,000 tons were limestone. Cinder, mill scale, scrap and other materials made up the balance. In addition to these solid materials, about 63,000,000 tons of air previously heated in hot-blast stoves were blown through the blast furnaces during the year.

## Correction

**I**N the article on "The Other Half of the Ventilation Question, by J. F. MacWilliams, electrical engineer, Pennsylvania Coal & Coke Corporation, in the May, 1935, issue of THE MINING CONGRESS JOURNAL, the following corrections are noted:

Instead of  $P = \frac{W \times V}{32.2 \times 5.2}$  it should have read  $P = \frac{W \times V^2}{32.2 \times 5.2}$  and Fan Diameter=18 ft. should have read Fan Circumference=18 ft.

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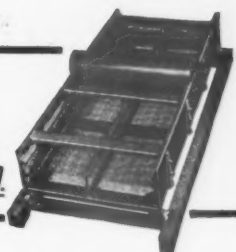
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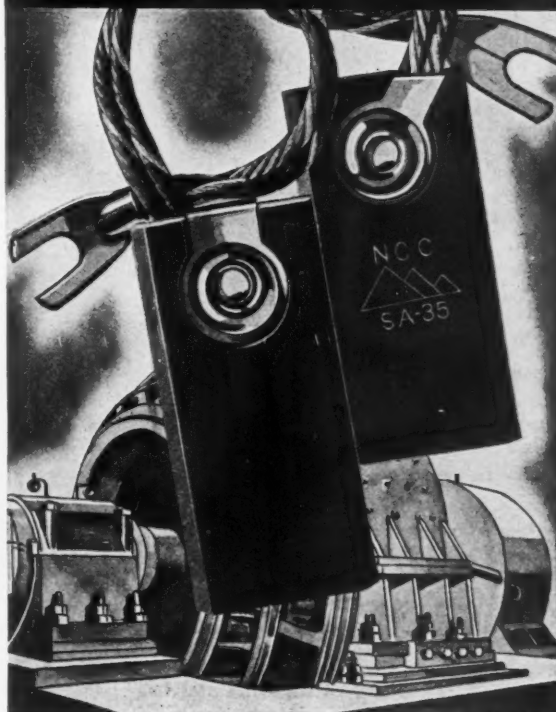


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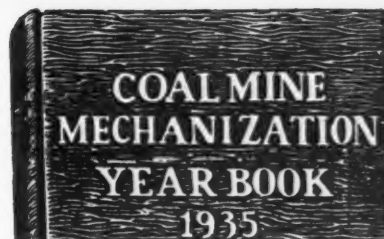
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